

MARKEDNESS, FAITHFULNESS AND CONSTRAINT PROMOTION IN OT LANGUAGE LEARNING: EVIDENCE FROM GREEK CHILD LANGUAGE

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1. INTRODUCTION

Except its widespread application in Phonology, Optimality Theory (hereafter OT, Prince and Smolensky 1993) is considered to be extremely successful as a theory of Language Learnability. OT makes two major statements about language learning. On the one hand, markedness constraints are considered to outrank faithfulness constraints in initial stages of development (cf. Tesar and Smolensky 1998, 2000), and, on the other hand, language learning proceeds by means of Constraint Demotion only (see Tesar and Smolensky 1998, 2000 about all versions of the constraint Demotion Algorithm, such as the Recursive Constraint Demotion Algorithm, Error-Driven Constraint Demotion Algorithm, Batch Mode Constraint Demotion Algorithm etc.).

My proposal in this paper is that neither of the above claims is a necessary prerequisite for Language Learning (cf. Smolensky et al. 2002). Faithfulness constraints can be ranked at the higher stratum of the constraint ranking above or together with other markedness constraints from the very beginning of the acquisition process. Furthermore, I argue that it is not always the case that constraint demotion is the only means for acquisition. I will provide evidence that constraint demotion as well as constraint promotion can give solutions to learnability issues. For the purpose of this paper I will rely on longitudinal data from 6 children acquiring Greek as their native language, varying in age between 1:07 and 3:05.29. I will focus on two independent phonological phenomena, namely the acquisition of pronominal clitics and the production of truncated forms.

The paper is organized as follows: In section 2 I provide an overview of the literature related to the issue under investigation, in section 3 the Greek child data are presented, in section 4 I provide a clear-cut OT analysis of the proposals I make, and I conclude with section 5.

2. PREVIOUS ANALYSES

The claim that, within OT, markedness constraints outrank faithfulness constraints in earlier stages of development is considered to be giving an answer to the so-called *subset problem* (cf. Tesar and Smolensky 2000, and more references therein) of language learning. According to the subset problem, it is easier for children acquiring a language to start with unmarked structures and then move to marked ones, irrespective of the degree of complexity of the language being acquired, rather than acquire marked structures and then have to switch to a more unmarked system. The second option would be quite confusing for the process of language learning. The assumption that Markedness outranks Faithfulness has been supported by production studies on L1, and L2 cross-linguistically (cf. Barlow 1997, Demuth 1995, 1996, 1997, 2001, Ohala 1999, Pater and Paradis 1996, Kehoe and Stoel-Gammon 1997, Pater 1997, Curtin 2002, Gnanadesikan to appear, for English, Broselow et al. 1998, on bilingualism, Goad and Rose to appear, for West Germanic, Levelt and Van de Vijver to appear, Zonneveld and Nouveau to appear, for Dutch, Kappa 2002, for Greek), as well as perception experiments (cf. Smolensky, Davidson and Jusczyk to appear, Pater to appear). However, there are production and perception studies that argue for the opposite ranking, namely that faithfulness outranks markedness (on production as well as perception data analyses see Bernhardt and Stemberger 1998, Velleman and Vihman 2002, for English).

The second major claim of OT is that language learning takes place in terms of constraint demotion rather than constraint promotion. The reason to make such an assumption is a technical one. If candidate A is the winner over B, then the B-favoring constraints must be dominated by the A-favoring constraints. This means that every B-favoring constraint is demoted below some A-favoring constraint. Quoting McCarthy (2002:203) 'By proceeding in this way, the learner is guaranteed to find some hierarchy consistent with the data, if there is any hierarchy to find'. Additionally, constraint demotion solves the so-called *credit problem*. I further quote Tesar and Smolensky (1998, 2000) and McCarthy (2002) who argue:

'The CDA (=Constraint Demotion Algorithm) cautiously extracts reliable information from mark-data pairs and uses this to demote constraints one by one, until the target ranking is reached'. 'Loser-favoring constraints are demoted. Why not promote the winner favoring constraints? Every loser-favoring constraint must be dominated by some winner-favoring constraint. ... A constraint promotion algorithm would have to pick some winner favoring constraint to promote, and the choice is not always obvious. ... when two constraints or principles concur in picking the right output, which one gets the credit? Constraint demotion always keeps track of which constraint does what simply by making sure that every loser favoring constraint is crucially dominated by some winner-favoring one with the C/D lemma.'

Interestingly though, Bernhardt and Stemberger (1998:258) report that the CDA fails to account for regressions, which are very common in language development. Moreover, I myself find it hard to understand why constraint promotion is susceptible to the credit problem. The data under investigation in this paper demonstrate that credibility is not a problem for constraint promotion. More specifically, optimal outputs make perfectly clear which winning favoring constraint(s) have to be promoted. Besides, constraint promotion does not mean that other constraints are necessarily demoted; it can be the case that winner-favoring constraints, which are promoted, occupy a position at the same stratum with other constraints that preserve their position in the stratum. This, in my view, constitutes the main argument for constraint promotion. On the other hand, highly ranked faithfulness constraints are not essentially in conflict with the subset problem. I argue that faithfully retained elements constitute the perceptual cues on which children base their productions as well as expand in the course of development. In OT terms, this is translated into the high ranking of faithfulness constraints.

The *Gradual Learning Algorithm*, which was first introduced by Boersma (1998) in his dissertation (hereafter GLA, see also Boersma and Hayes 2001) supports that language learning does not purely rely on demotion. The shifting of constraints in the ranking can be either in the form of demotion or the form of promotion. That way, the GLA makes sure that variation can be captured, and seems to be a more realistic model of phonological acquisition. The GLA seems capable of learning grammars that produce stage-like variation, and it is sensitive to speech errors (early output productions).

3. THE GREEK FACTS

My data source is a longitudinal corpus of data from children acquiring Greek as native language varying in age between 1;07 and 3;05.23. The whole database consists of the data from 11 children¹. For this paper I am using the data of six children, 3 female and 3 male, covering the same age range. The children's names and age range are given in (1) below.

- (1) Melitini (Me.): 1;07.05-2;04.17
 Bebis (Metaxaki) (B1.): 1;09.22-2;10.23
 Bebis (Tzakosta) (B2.): 1;10-2;01.05
 Felina (Fe.): 1;11.07-3;02.12
 Dionisakis (D.): 2;01-2;08.29
 Marilia (Ma.): 2;07.06-3;05.23

In the following subsections I will provide the evidence that supports my assumptions that markedness over faithfulness and constraint demotion, over constraint promotion, are not necessary or absolute for language learning.

3.1. *Pronominal Clitics*

Pronominal clitics, both single and pairs, are weak/ short forms of the 1st, 2nd, 3rd sg. and pl. personal pronouns, which encode features of direct (ACCUS) and indirect (DAT/GEN) object. My observations regarding the phonological acquisition of clitics are the following:

¹ The database is currently being set up by specialists, computer programmers and phoneticians, at the University of Leiden Centre for Linguistics.

1. Enclitics are the first clitics to emerge and are the ‘favorite’ clitics in child language (2 a-e). Proclitics appear later than enclitics. Proclitics are deleted in earlier stages, when enclitics are produced, though (2f-g). Single enclitics are post-stress elements and they become easily part of the minimal prosodic word. Children do not treat clitics simply as extrametrical syllables (2c,d). In OT terms, this means that there is a FAITH (EN)CLITIC constraint that is highly ranked from the very beginning with other markedness constraints, but also above other markedness constraints. The facts presented in the examples (2)-(8) give a first hint about the problems created for the CDA initial M>>F ranking.

- (2) a. /ðos(e)**mu**/ → [ðo.se**μ**], [ðo.bu], [ðo.mu] ‘give-2ND.SG.IMP.ME’²
 b. /vɣal(e)**to**/ → [vɣa.to] PrWd ‘take out-2ND.SG.IMP. IT’
 c. /par(e)**ti(n)**/ → [(pa.ti)], [(pa.ti).ne] ‘take-2ND.SG.IMP. HER’
 d. /ðos(e)**to**/ → [e.(jo.to)] ‘give-2ND.SG.IMP. IT’
 e. /par(e)**to**/ → [(pa.to).no] ‘take-2ND.SG.IMP. IT’
 f. /ti ‘vazo/ → [va.zo] ‘IT put-1ST.SG.PRES.IND.’
 g. /θa to ‘paro/ → [pa.ro] ‘IT take-1ST.SG.FUT.IND.’

2. With respect to clitic pairs, one member of the pair is word internal and not adjoined to the phonological word. This is a characteristic of both adult and child language in Greek, as shown in (3).

- (3) a. /ðose‘**mu-tin**/ → [[ðo.mu.]_{prwd}**ti**]_{prwd} ‘give-2ND.SG.IMP. ME-HER’
 b. /ðose‘**mu-to**/ → [[ðo.mu.]_{prwd}**to**]_{prwd}, [to.to.]_{prwd} **mu**]_{prwd} ‘give-2ND.SG.IMP. ME-IT’
 (4) a. /to ‘(e)xo/ → [to.co] ‘IT-have-1ST.SG.PRES.IND’
 b. /tin ‘(e)vales/ → [ti.va.leθ] ‘HER- put-2ND.SG.PAST.IND’
 c. /to ‘(e)kane/ → [to.ka], [to ‘e.ka] ‘IT-do-3RD.PAST.IND’

3. Proclitics become more frequent when a. tenses (i.e. finiteness) and the subjunctive (i.e. mood) start being acquired (see examples in (4) above and (5) below) as well as when b. they undergo fusion, that is, when they become part of the minimal word or the foot. More details regarding the acquisition of proclitics are irrelevant at this point. Nevertheless, what is important to be clarified is that it is the complex syntactic structure part of which are the proclitics, as well as factors of asymmetry that cause proclitics to delete, and not children’s inability to produce clitics. This is further demonstrated by the examples in (6), where it is shown that children can produce clitics, but they prefer the enclitic form. Naturally, faithfulness to proclitics increases in the course of development, up to the point they are never deleted or substituted for enclitics.

- (5) a. /na to ‘parume/ → [to ‘pa.lu.me] ‘IT-take-1ST.SG.PRES.SUBJ’
 b. /θa to aɣo‘raso/ → [to.yo.‘la.co] ‘IT-buy-1ST.SG.FUT.IND’
 c. /to ‘vrice/ → [to.bi.ce], [to.vi.ce] ‘IT-find-3RD.SG.PAST.IND’
 d. /me ‘ðagose/ → [me.go] ‘ME-bite-3RD.SG.PAST.IND’
 e. /θa to ‘parume/ → [pa.‘pa.ru.me] ‘IT-take-1ST.PL.PRES.IND’
 (6) a. /θa to ‘vvalo/ → [va.lo.to] ‘take out-1ST.SG.FUT.IND. IT’
 b. /θa to ‘valo/ → [va.lo.to] ‘put-1ST.SG.FUT.IND. IT’

4. Just like single enclitics are the first to emerge, enclitic pairs are also the first to emerge

- (7) a. /pare‘**mu-to**/ → [pa.le.‘**mu.to**], [pa.le.‘**to.mu**] ‘take from-2ND.SG.IMP. ME-IT’
 b. /ðose‘**mu-to**/ → [ðo.mu.‘**to**], [ðo.ce.‘**mu.to**], [lo.θe.‘**mu.to**], [ðo.θe.‘**mu.to**], [to.‘**to.mu**]
 ‘give-2ND.SG.IMP. ME-IT’
 c. /na tis ta ‘ðoso/ → [na ti ‘ðo.co] ‘HER-THEM give-1ST.SG.PAST.SUBJ’
 d. /**mu to** ‘pire/ → [mu to ‘pi.re] ‘ME-IT take from-3RD.SG.PAST.IND’

The above examples demonstrate that clitics, especially enclitics, both single and pairs, exhibit a high percentage of faithful production in child speech even in its early stages. Clitics seem to be essential in child

² Greek clitics both single and pairs are monomorphemic and monosyllabic. They are in bold letters in the examples. The input-adult forms are in slashes and the children’s outputs in square brackets. The parenthesized (e) in the input denotes that it is not necessary to appear in the adult form. It can undergo deletion.

speech³. Except for the metrical reasons mentioned above, it is possible that clitics are faithfully preserved because a) they occupy words edges, to which children are considered to be sensitive, and b) they consist of unmarked CV syllable constructions, which, in turn, consist of unmarked segments (e.g. coronal stops). I leave this issue for further investigation.

3.2. Truncation

In this section I turn to the second phenomenon widely found in child language, truncated forms. Here, I am trying to show that, irrespective of the prosodic shape of the target forms, and the shape that these forms take in child speech, children are faithful to the stressed syllable, whatever its position in the word. Consequently, both iambic and trochaic words emerge. In the examples (8)-(22), disyllabic, trisyllabic, and four-syllabic target words are truncated and produced with all kind of possible stress patterns, with the stress on the ultimate, the penultimate or the antepenultimate syllable⁴. As a result, stress patterns, not particularly popular in cross-linguistic language acquisition studies, are produced for the sake of the preservation of the stressed syllable⁵. The stressed syllable is the prosodic cue, which constitutes the base for all kinds of phonetic outcomes. In terms of OT, this means that the constraint requiring faithfulness to the prosodic head, which in the case of the acquisition of stress is the stressed syllable, is highly ranked from the initial stage of language learning and during the whole process of phonological development. This further underlines the fact that it is not clear whether markedness outranks faithfulness in the beginning of language development⁶.

- (8) Dissyllabic target forms (WS words produced as SW)
 (a) /u.'ra/ → [u.la] 'tail' (B2. 1;10)
- (9) Dissyllabic target forms (SW words produced as WS)
 (a) /va.lo/ → [və.'lo] 'to put' (B1. 1;09.22)
- (10) Trisyllabic target forms (SWW words produced as SW)
 (a) /ko.ci.na/ → [ko.ci] 'red-PL' (Me.2;01.24)
 (b) /e.va.la/ → [e.vla] 'put-1st.SG.PAST' (D. 2;01.24)
 (c) /ko.ko.ras/ → [ko.koθ] 'rooster' (D. 2;03.28)
 (d) /fa.ɣa.me/ → [fa.ɣa] 'eat-1st.PL.PAST' (Me. 2;09.26)
- (11) Trisyllabic target forms (SWW words produced as WS)
 (a) /e.kli.se/ → [kli.'θe] 'shut-3rd. SG. PAST' (Fe. 2;06.17)
- (12) Trisyllabic target forms (WSW words produced as SW)
 (a) /a.'xla.ði/ → [a.ði] 'peach' (B2. 1;10)
 (b) /ku.'ku.la/ → [ku.la] 'hat' (Me.2;0.02)
- (13) Trisyllabic target forms (WSW words produced as WS)
 (a) /mo.'li.vi/ → [mo.'li] 'pencil' (Me. 1;07.14)
 (b) /ma.'çe.ri/ → [ma.'çe] 'knife' (F. 3,02.12)
- (14) Trisyllabic target forms (WWS words produced as SW)
 (a) /for.ti.'ɣo/ → [lo.ci] 'lorry' (D. 2;02.06)
- (15) Trisyllabic forms (WWS words produced as WS)
 (a) /va.si.'ɣas/ → [va.'ɣaθ] 'king' (D. 2,03)
 (b) /a.le.'pu/ → [ne.'pu] 'fox' (D. 2;04.24)
- (16) Four-syllabic target forms (WSWW words produced as SW)

³ For more details regarding the emergence of certain type of clitics in the speech of all of the above children and statistical verification of the above facts see Tzakosta (to appear).

⁴ For statistical evidence supporting these theoretical claims see Tzakosta (2003).

⁵ Stress errors favoring trochees are extremely limited in the Greek data. This is another argument for the fact that Greek child language is not biased towards trochaic patterns (for more details see Tzakosta in prep.).

⁶ for more details see Tzakosta (in prep).

- (a) /po.ði.la.to/ → [la.to] 'bicycle' (D. 2;02.06)
- (17) Four-syllabic target forms (WSWW words produced as WS)
 (a) /ma.'ri.li.a/ → [ma.'ril] 'Marilia-PR.N.' (D. 2;04.05)
 (b) /pa.'ti.sa.me/ → [pa.'ti] 'step-1st. PL. PAST' (Ma. 2;08.15)
- (18) Four-syllabic target forms (WWSW words produced as SW)
 (a) /pe.ta.'lu.ða/ → [lu.ða] 'butterfly' (B2. 1;11.09)
 (b) /ma.ri.'le.na/ → [ne.na] 'Marilena-PR.N.' (Fe. 1;11;25)
- (19) Four-syllabic target forms (WWSW words produced as WS)
 (a) /ði.o.'ni.sis/ → [i.'ðiθ] 'Dionisis-PR.N.' (D. 2;01)
 (b) /a.di.'yo.ni/ → [ti.'yo] 'Adigoni-PR.N.' (Fe. 2;07.03)
- (20) Four-syllabic target forms (WWSW words produced as WSW)
 (a) /pe.ri.'ste.ri/ → [pa.'te.li] 'pigeon' (D. 2,03.07)
 (b) /ya.lo.'pu.la/ → [a.'ku.la] 'turkey' (Fe. 2;02.24)
- (21) Four-syllabic target forms (WWSW words produced as WWS)
 (a) /ku.ta.'la.ci/ → [ku.ta.'la:] 'spoon-DIM.' (Me. 1;11.22)
 (b) /lu.lu.'ða.ca/ → [lu.lu.'ða:] 'flowers-DIM.' (Ma. 2,09.27)
- (22) Four-syllabic target forms (WWWS words produced as WS)
 (a) /por.to.ka.'li/ → [ka.'li] 'orange color' (D. 2;07.03)

Due to the fact that the present paper is not devoted to the examination of truncated forms in Greek child language, I will not elaborate further on this issue. I hope that the data have given enough evidence regarding the major issues that concern this paper, namely the initial state of OT constraints and their behavior with respect to each other in the course of development. I will develop my ideas with OT analyses of clitics and truncated forms in the next section.

4. PROPOSAL

In this section I wish to establish my theoretical claims on the basis of an Optimality Theory analysis. In section 4.1 I will provide an analysis of the clitics data and in 4.2 I will provide an account of the truncated forms, where it will be clearly shown that Markedness can outrank Faithfulness in the initial stages of acquisition, as well as learning can take place by means of constraint promotion except for demotion.

4.1. OT analysis of Clitics

The constraints I am using for my analysis are a. those mainly known as constraints on prosodic domination, b. alignment constraints, c. other well-formedness constraints and d. faithfulness constraints.

EXH: No PrWd immediately dominates a syllable

MINWD = produced forms must maximally bimoraic or disyllabic⁷

ALIGN-CL-L/R: The left (right) edge of clitics coincides with the left (right) edge of the PWd.

INTEGRITY: no part of the word (PWd) is deleted

FAITH CLITICS: (en/pro)clitics in the input also surface in the output

Given the developmental stages discussed above, the relevant constraint rankings are the following:

Stage 1

In this stage monosyllabic enclitics emerge, but no proclitics. Rare substitution of proclitics for enclitics also occurs. This means that the constraints demanding word minimality, as well faithfulness to the clitic element at the right edge are highly ranked, as shown in (23)

(23) MINWD, FAITH(clitic), ALIGN-CL-R, EXH >> ALIGN-CL-L >> INTEGRITY

⁷ I do not use the Non Recursivity constraint (NONREC), since this constraint is kind of absorbed by the MINWD constraint. The necessity for maximally disyllabic productions does not leave space for recursivity effects.

Tableau 1 (fused enclitics)
/ðoseto/

FORMS/CONS	MINWD	FAITH CL	ALIGN-CL-R	EXH	ALIGN-CL-L	INTEGR
[[ðo.se] _{PWD} to] _{PWD}	*!			*	*	
☞ [ðo.to] _{PWD}					*	*
[ðo.se.to] _{PWD}	*!				*	

The same ranking holds for the cases where proclitics are substituted for enclitics (see tableau 2). The production of proclitics as enclitics further supports the claim that enclitics, and consequently the right edge, are unmarked.

Tableau 2 (enclitics instead of proclitics)
/ða to 'yalo/

FORMS/CONS	MINWD	FAITH CL	ALIGN-CL-R	EXH	ALIGN-CL-L	INTEGR
[[to['ya.lo] _{PWD}] _{PWD}	*		*!	*		*
☞ ['ya.lo.to] _{PWD}	*				*	*

Stage 2

In the second stage, single proclitics and enclitic pairs are produced, and stress retraction takes place. Constraints demanding alignment with both edges are essentially promoted to the higher stratum, where faithfulness to the clitic still occupies a position. Also, even though clitics are not stressed in their underlying representation, they emerge as if they are stressed in their surface representation. The relevant constraint ranking, which gives the optimal output, is provided in (24) and tableau 3 below. In the constraint ranking it is clear that no demotion takes place. Up to this stage development proceeds by means of constraint promotion only. The ranking remains the same for the cases illustrated in tableau 4, where proclitics are part of the minimal words produced, whereas part of the base is deleted.

(24) MINWD, FAITH (clitic), ALIGN-CL-R, ALIGN-CL-L, EXH >>> INTEGRITY

Tableau 3 (mon. Proclitics)
/to 'exo/

FOMRS/CONS	MINWD	FAITH CL	ALIGN-CL-R	ALIGN-CL-L	EXH	INTEGR
☞ ['to.ɔ] _{PWD}			*			*
[[to['e.xo] _{PWD}] _{PWD}	*!		*		*	
[to 'e.xo] _{PWD}	*!		*			

Tableau 4 (proclitics as minimal words)
/me 'ðagose/

FOMRS/CONS	MINWD	FAITH CL	ALIGN-CL-R	ALIGN-CL-L	EXH	INTEGR
[me 'ða.go.se] _{PWD}	*!		*			
☞ [me:.go] _{PWD}			*			*

Stage 3

In the third stage, enclitics and proclitics, both single and clitic pairs emerge. Moreover, stress readjustment takes place correctly. At this stage learning proceeds both by means of constraint demotion *and* constraint promotion. INTEGRITY is promoted to the first, that is, higher stratum, while the constraint demanding word minimality is demoted to the second lower stratum, since it is not crucial for the selection of the optimal candidate (25). The candidate indicated by the question mark in tableau 6 further demonstrates that it is not the Phonology of the language that determines the winner but rather the Syntax. Syntactic constraints are necessary to be introduced in order to account for the optimal outputs.

(25) FAITH(clitic), ALIGN-CL-L, ALIGN-CL-R, INTEGRITY, EXH >> MINWD

Tableau 5 (enclitic pair)

/pare, muto/

FORMS/CONS	FAITH CL	ALIGN-CL-L	ALIGN-CL-R	INTEGR	EXH	MINWD
☞[[pa.le] _{PWD} , to.mu] _{PWD}		*				*
☞[[pa.le] _{PWD} , mu.to] _{PWD}		*				*
[pa.to] _{PWD}	*!	*		*		

Tableau 6 (proclitic pair)

/θa mu to 'ðosis/

FORMS/CONS	FAITH CL	ALIGN-CL-L	ALIGN-CL-R	INTEGR	EXH	MINWD
☞[[e.mu.to]'ðo.θiθ] _{PWD} _{PWD}			*!			*
?[[to.mu]'ðo.θiθ] _{PWD} _{PWD}			*!			*

4.2. Truncations

The data displayed in (8)-(22) underline the fact that Greek children are sensitive to stress from the very beginning (cf. Mehler et al. 1988, Jusczyk, Cutler and Redanz 1993, for a perceptual account of English). They preserve the stressed/ prominent syllable in their productions irrespective of the accentual template it fits in. The constraints involved in my analysis of truncations are:

FTBIN= produced feet must be maximally bisyllabic or bimoraic (McCarthy and Prince 1994a,b).

ALIGN-L = align the left edge of a foot with the left edge of the prosodic word (McCarthy and Prince 1994a,b)

ALIGN-R = align the right edge of every foot with the right edge of the prosodic word (McCarthy and Prince 1994a,b)

PARSE = every syllable must be part of a foot (Prince and Smolensky 1993)⁸

STRESSFAITH = an input stressed element must have as its output correspondent a stressed element (Pater 1997)

FAITH = preserve the prosodic structure of the input in the output

The children under examination exhibit the developmental patterns illustrated in (26). As shown in (26a), all children follow the same path regarding the acquisition of SW and WS disyllabic and SWW trisyllabic target words. That is, SW and WS words are produced as monosyllabic in earlier stages of acquisition, and they are produced correctly in subsequently stages, with very small percentages of stress errors⁹, whereas SWW words are produced as disyllabic truncated forms with the stress on the right syllable. The picture changes with respect to WSW and WWSW target words, as shown in (26b). The male subjects (1st group) truncate these target words to trochaic SW and WSW respectively, while the female subjects (2nd group) truncate the same words to iambic WS and WWS respectively.

(26) a. SW, WS → S, SW → SW, WS → WS, SWW → SW (for all children)

b. WSW → SW, WWSW → WSW (for B1, B2, D, 1st group)

WSW → WS, WWSW → WWS (for Me., Fe., Ma., 2nd group)¹⁰

Now, the question is how the above effects are in a constraint ranking are further supported. The answer is given in the following constraint rankings interpreted in terms of constraint rankings and whether my claims about the initial state of constraints and their behavior and OT tableaux. The tendencies schematized in (26) are further illustrated in tableaux 7-10. The FAITHSTRESS constraint is highly ranked, occupying a position in the higher stratum. Consequently, the ranking for the first group of children exhibiting the data schematized in (26a) is given in (27). In all tableaux, it is clearly shown that FAITHSTRESS is highly ranked throughout phonological acquisition, implying that Faithfulness outranks Markedness as far as the acquisition of stress is concerned.

(27) FAITHSTRESS, FTBIN, ALIGN-L, PARSE >> ALIGN-R >> FAITH

⁸ If we accept that children perceive raw sequences of syllables and not structural descriptions, this constraint is irrelevant to the analysis. For the moment I keep the constraint and leave the question for further research.

⁹ For more statistical details see Tzakosta (2003).

¹⁰ Schema (27) does not imply developmental stages, but developmental paths towards the acquisition of the adult grammar.

Tableau 7

/a'xlaði/	FAITHSTRESS	ALIGN-L	FTBIN	PARSE	ALIGN-R	FAITH
[(a.xla)]		*!				*
☞ [(a.ði)]					*	*
[(a.xla)]	*!				*	*
[a.(xla.ði)]		*!		*	*	

For the second group of children, those that produce WS words and WS truncations of WSW target words, the ranking is slightly different, namely ALIGN-R is ranked together with FTBIN and PARSE instead of ALIGN-L, as shown in (28). Nevertheless, FAITHSTRESS is highly ranked for them too.

(28) FAITHSTRESS, ALIGN-R, FTBIN, PARSE >> ALIGN-L >> FAITH

Tableau 8

/mo'livi/	FAITHSTRESS	ALIGN-R	FTBIN	PARSE	ALIGN-L	FAITH
[(mo.li)]	*!	*				*
☞ [(mo.'li)]					*	*
[mo.(li.vi)]		*!		*	*	
[mo.(li)]			*!	*	*	*

When truncations consist of more than two syllables, that is, when children become more faithful to their input and trisyllabic WSW truncations of WWSW target words are produced by the first group, we have simultaneous promotion and demotion of constraints. FAITH is promoted, while FTBIN is demoted as shown in (29) and tableau 9 respectively.

(29) FAITHSTRESS, FTBIN >> ALIGN-L >> FAITH >> ALIGN-R, PARSE

Tableau 9

/peri'steri/	FAITHSTRESS	FTBIN	ALIGN-L	FAITH	ALIGN-R	PARSE
[(pe.ri).(ste.ri)]			**!		*	
[(pa.te).li]	*!			*	*	*
☞ [pa.(te.li)]			*	*	*	*
[(pa.te)]	*!			**	*	
[pa.(te)]		*!		**		*
[(pa.te)]			*	**!		

The same holds for the second group of children who produce trisyllabic WWS truncations of WWSW target words (see ranking in (31) and tableau 10). The difference between the two groups remains the different ranking of the ALIGN-L and ALIGN-R constraints. The truncation data additionally show that Tesar and Smolensky's CDA fails to perfectly account for the data of the truncated forms found in Greek child language. The Algorithm has to be refined in such a way so as to include these 'problematic' cases.

(31) FAITHSTRESS, FTBIN >> ALIGN-R >> FAITH >> ALIGN-L, PARSE

Tableau 10

/kara'meles/	FAITHSTRESS	FTBIN	ALIGN-R	FAITH	ALIGN-L	PARSE
[(ka.ra).(me.les)]			*!		**	
[a.(me.les)]			*!	*	*	*
[ka.(ra.me)]	*!		*	*	*	*
☞ [ka.(ra.'me)]				*	**	*
[(a.me)]				**!	*	
[(ka.ra).(me)]		*!		*	**	

5. CONCLUSIONS

I wish that the data from the acquisition of clitics and stress have independently but convincingly shown that markedness is not only and always higher ranked in the initial stages of language development. Faithfulness constraints can be ranked above all or at the same stratum with markedness constraints. Moreover, constraints are not necessarily demoted. In the above analyses it was shown that faithfulness and/ or markedness constraints can also be promoted in order to occupy a position at the same stratum with the higher ranked faithfulness and/ or markedness constraints or even occupy a stratum on their own. Simultaneous demotion and promotion of constraints was another option. That way, it was proved that language development can be achieved by means of both promotion and demotion of the constraints.

The Constraint Demotion Algorithm is designed to learn the final ranking through positive evidence. Nevertheless, it fails to capture gradual progression, variation (cf. Curtin 2002 for further discussion) and regressions (see Bernhardt and Stemberger 1998). It is clear that the CDA needs to be refined. On the other hand, the Gradual Learning Algorithm (Boersma 1998, Boersma and Hayes 2001), discussed very briefly in this paper, seems to make better theoretical predictions, since it allows for both constraint promotion and demotion in the course of development. But this is something I will have to carefully check with the data, so I leave it for further research.

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