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Perspectives on Arabic Linguistics

XVII–XVIII

EDITED BY
Mohammad T. Alhawary
Elabbas Benmamoun

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Perspectives on Arabic Linguistics XVII–XVIII
Papers from the Seventeenth and Eighteenth Annual Symposia on Arabic Linguistics

PERSPECTIVES ON ARABIC Linguistics XVII-XVIII

PAPERS ROM THE SEVENTEENTH AND EIGHTEENTH ANNUAL SYMPOSIA ON ARABIC LINGUISTICS

Edited by

MOHAMMAD T. ALHAWARY
The University of Oklahoma

ELABBAS BENMAMOUN
University of Illinois, Urbana-Champaign

JOHN BENJAMINS PUBLISHING COMPANY
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EDITORIAL NOTE

The papers in this volume were presented at the Seventeenth and Eighteenth Annual Symposia on Arabic Linguistics, held in Alexandria, Egypt in May of 2003 and at the University of Oklahoma in March of 2004, and sponsored by the University of Alexandria and the University of Oklahoma, respectively. Of the forty-one papers presented at both symposia, twelve are published here. The papers presented at the symposia were selected on the basis of an anonymous review of abstracts submitted to the program committees. The papers included in the current volume were also subject to another tier of peer review process.

The 2003 and 2004 symposia and the present volume would not have been possible without the generous collaboration of many people. We extend our thanks to all of our contributors for turning their symposia presentations into written papers. We are especially indebted to the many anonymous reviewers at the abstract and the written paper stages. Thanks also go to Rachel Muchmore from the University of Oklahoma for helping with some of the formatting.

The transcription of all Arabic materials in the body of the papers and appendices follows the International Phonetic Alphabet or standard equivalents. The Arabic emphatics are represented by a dot underneath the symbol (except in the first paper where a superscript [ˤ] symbol is used instead of the dot) and long vowels as sequences of two identical vowels or [:]. For the citation of Arabic titles in the references sections, a simplified transliteration system based on standard usage in Arabic and Middle East Studies journals has been adopted. Long vowels are marked. The symbol ’ represents the *hamza* and ‘ represents the *‘ayn*.

The preparation and printing of the final manuscript was done using facilities available at the University of Oklahoma.

INTRODUCTION

Mohammad T. Alhawary and Elabbas Benmamoun

The papers in this volume tackle a broad range of issues in current linguistic research, particularly in the areas of phonology, morphology/lexicon, sociolinguistics and first and second language acquisition. Contributions to the Perspectives series continue to be distinguished for the depth of coverage and the types of data considered.

The paper by John McCarthy addresses the long-standing problem of vowel length alternation in Arabic dialects. In various dialects, final short vowels lengthen when followed by a suffix. Within traditional analyses, there is no consensus as to which vowel form is basic and which form is derived. Both logical options have been adopted with no clear argument as to which one is more empirically adequate. McCarthy provides an alternative analysis within the Optimality Theory (OT) framework. He argues that OT provides a better account for the indeterminacy provided that one accepts the view that the base is richer than traditionally assumed. Given this assumption, together with a number of constraints, one can rely on grammar, rather than lexical stipulations governing so-called underlying representations, to filter out non-occurring forms.

Also assuming the OT framework, Abdessatar Mahfoudhi focuses attention on the related issue of the distribution of complex syllables in Arabic dialects, particularly Cairene Arabic, Makkan Arabic and Tunisian Arabic. While all Arabic dialects generally display the CV, CVC and CVV patterns, they differ with respect to the complexity of the edges of syllables. Tunisian Arabic allows complex onsets but not Cairene Arabic and Makkan Arabic. On the other hand, all three dialects allow CVVC and CVCC in the final position but only Tunisian Arabic allows the latter internally while only Cairene Arabic and Makkan Arabic allow it domain-finally. The author recapitulates arguments, mostly based on stress, that the final consonant in the CVVC and CVCC syllables in particular is not moraic, because it is not considered in the computation of weight for stress assignment. The final syllable is rather remotely licensed essentially through adjunction

to the syllable. Typical of OT accounts, Mahfoudhi relies on a number of constraints that govern the distribution of syllables and their edges and 'operations' that can affect the base (faithfulness constraints) to derive the occurring patterns and the variation that Arabic dialects display.

Khaled Rifaat presents a preliminary descriptive account of the intonation of Modern Standard Arabic (MSA) on the sentence level. In particular, the study is designed to verify the widely held claim that Arabic intonation system is 'simple' and plays a minor role in the prosodic system of Arabic. Rifaat's analysis focuses on the notion of 'structural simplicity' where the notion of a 'simple' intonation system is defined as one containing few elements and rules. Rifaat relied on a corpus of approximately 15 hours of MSA recorded data from the Egyptian radio which he analyzed for tone-sequence within autoseg-mental metrical phonology framework. The analysis reveals that MSA has a 'simple' intonation system with a tendency of pitch accents to be accentuated, basic declined trend line tunes, association of non-final or continuation tunes with rising trend line or rising pitch accents and a limited use of pitch accents span to denote 'focus'. In addition, a small number of tune structures, pitch accent types and combinatorial properties were detected.

Hanaa Salem's paper is also descriptive in nature. The paper provides a descriptive account of phonological processes in connected speech in Colloquial Egyptian Arabic (CEA) in Alexandria together with their possible phonemic variations. The data of the study were recorded from normal, conversational speech of CEA in Alexandria on the radio. The data were analyzed for the types of processes exhibited as well as their frequency of occurrence. The analysis shows that a number of processes, such as elision, shortening, germination, and assimilation, are at play with different frequencies of occurrence.

The paper on root formation, by Lazhar Zanned, addresses the notion of polysemy in Classical Arabic lexicon. Zanned argues that the rules governing Arabic root formation generate polysemy in an unavoidable way. Assuming a root organization and generation stance divergent from those proposed in earlier models, such as the Extensionist Model, the Epenthesis Model, and the Combinatorial Model, Zanned presents the Probabilistic Model as an alternative model

that can better account for the phenomenon of polysemy. Rejecting a bi-radical or any diachronic basis for Arabic root formation, Zanned argues that root formation is probabilistic and can instead be assumed to be triconsonantal, quadriconsonantal or quinqueconsonantal. Focusing on triconsonantal roots, Zanned claims that three listemes cross at any given root resulting in a polysemic form (bearing, at least, three meanings) and comprising three identical consonantal copies, each of which bears its own meaning inherited from its own listeme; hence, polysemy is unavoidable. The model is further claimed to account for the morphological phenomenon of reduplication based on the same rationale.

Amr Ibrahim engages the important, but still understudied, issue of light verbs in Arabic, with special focus on Modern Standard Arabic. The paper provides a survey of modern linguistic and traditional Arabic linguistics views on the distribution of verbal and nominal predicates, which in the latter case may involve the use of a light verb plus the nominal form of the main predicate. Ibrahim also discusses the semantic and pragmatic interpretations of constructions using light verbs and constructions that do not use them, claiming that the former are less ambiguous than the latter, which they subsume. Another important issue that arises in this context, and which the paper briefly discusses, concerns the fact that the lexical origins of light verbs vary crosslinguistically. In fact, even within the same linguistic family, such as Arabic, a light verb that has more extensive usage in Standard Arabic may have a more narrowly constructed usage in the modern dialects. This, in turn, raises its own questions related to language change and the so-called process of grammaticalization.

Mustafa Mughazy deals with lexical aspect in Egyptian Arabic, a complex topic that, with few notable exceptions, has not received the adequate attention it deserves within Arabic linguistics. He presents a number of morphological and syntactic cues to help classify Egyptian Arabic verbs along aspectual dimensions. He claims that verbs adhere to the universal classifications assumed for other languages where verbs belong to four classes of State, Activities, Achievement or Accomplishment, which are in turn based on the set of the universal primitive features [+durative], [+telic], [+dynamic]. Mughazy then argues that lexical aspect relates to event descriptions, which can vary.

Thus, the same event can be rendered by an achievement or an accomplishment predicate. Consequently, language variation has to do with how eventualities are described. This analysis allows Mughazy to account for the distribution of different classes of verbs in Egyptian Arabic and for the differences between the behavior of such verbs in Egyptian Arabic and other languages such as English and possibly other dialects of Arabic, though this potentially fruitful issue of dialectal variation as it pertains to lexical aspect still needs to be investigated.

The paper on building a computational lexicon, by Sameh Al-Ansary, discusses a corpus-based approach for building a computational lexicon of MSA. The proposed lexicon is implemented in AGFL (Affix Grammar over Finite Lattices) format to be used by any corpus analysis software designed with AGFL formalism. The lexicon contains lexical entries, a tagset for morphological, syntactic and semantic features, a text analysis interface, a database management system (to automatically examine analyzed data), an interactive component, a statistical component, and an AGFL formalism. Al-Ansary's contribution lies not so much in the discussion of the component parts and tools of the proposed lexicon, for indeed there are other attempts, as much as it lies in the specific handling of tagging corpora with the implemented set of morphological and grammatical parts of speech tags, such as categorical information, morphological patterns, suffixes, root, gender, number, aspect, etc. As the corpus gets tagged and each surface word is assigned linguistic features from the tagset, a practical lexicon does emerge from the tagging process that is adequate for a proper morphological, syntactic and semantic description of naturally occurring Arabic data and for various Arabic NLP applications. Although the lexicon in question is small (consisting of 1500 entries), it is claimed to have been sufficiently tested and proven adequate in the corpus analysis tasks for which it is intended initially, such as morphological decomposition, lemmatization, tagging, and parsing.

Naima Boussofara-Omar's paper contributes to ongoing discussions of language and power; in particular, the 'linkages' between language ideologies and speakers' language valuation and language use in institutions of power with a special focus on political speeches in diglossic and bilingual Tunisia. Boussofara-Omar analyzes the original

text of a presidential speech/Communiqué together with the corrections brought to the original handwritten draft and attempts to explore the dialectic relation between form and ideology through an analysis of the significance of the Communiqué in terms of the socio-political conditions of its production and in terms of its linguistic forms. The main premise of Boussafara-Omar's thesis is that, following Bourdieu (1991), Spitulnik (1998) and others, language ideologies and processes of language valuation are never just about language and that language ideologies are about the construction and legitimization of power. Boussofara-Omar claims that constructs of prestige, power and authority of a linguistic code (Classical Arabic) do not "accrue" transparently and automatically to the privileged social group that uses it and that such processes may also be "costly". This is because, according to Boussofara-Omar, any incorrect or faulty use of *fuṣħaa* takes authority away from its user, especially when the text is an official presidential speech and the language of choice is being used as an attempt to legitimize the new authority. Accordingly, this accounts for the user's need to subject their linguistic texts to the scrutiny of professional and even non-professional correctors both of which seem to be in turn equally aware of 'correction' as an institution and of *fuṣħaa* as a language of authority.

In her paper on agreement alternations, Heidi Lorimor revisits the issue of subject-verb agreement in Arabic. Lorimor focuses on the issue of agreement alternations whereby the verb that usually fully agrees with a preverbal subject may agree only partially, for example, in gender but not number, or may agree with one NP only in the context of coordination. She also brings into the picture the case of singular agreement in the context of inanimate plural subjects attested in a number of dialects such as Cairene Arabic. Lorimor discusses a number of alternative options to capture the alternations. The two most prominent alternatives are whether the agreement alternations in question are semantically grounded or whether a syntactic account is better suited to the facts. The semantic account is based on findings in psycholiguistic experiments which seem to indicate that agreement morphology, whether singular or plural, depends on whether the speaker perceives the subject as notionally plural. The syntactic account relies mainly on the lexical entries of the noun phrase (the features for

which it is specified) and the structural configuration it finds itself in, yielding a single output that may or may not undergo further alterations in the morpho-phonology. The question then is whether all the agreement alternations in Arabic can receive one uniform account. Lorimor provides arguments to show that, despite attempts to provide such uniform accounts, the agreement alternations in Arabic cannot all be collapsed under the same generalization. Agreement in the context of inanimate nouns lends itself readily to a semantically grounded account while first conjunct agreement is better handled by a syntactic account whereby the conjunction in question is clausal rather than phrasal.

Fatima Badry reports on a study that investigated cognitive and typological predispositions employed in the development of lexical derivational processes by Moroccan Arabic speaking children learning Arabic as an L1. The study attempted to replicate evidence from crosslinguistic studies suggesting that children's acquisition strategies are influenced both by their universal predispositions as well as by the pervasiveness and regularity of the word formation rules in their language. Based on L1 cross-sectional acquisition data, the results of the study show that 3;5 year olds are already able to derive the causative verb patterns and have begun to derive reciprocal patterns followed by the medio-passive—a sequence in line with a cross-linguistic observation attributed usually to cognitive development. More importantly, the results also showed that the pervasiveness of root-based derivations in the Arabic lexicon draws the attention of L1 Arabic children to such processes and leads them to rely on root/pattern alternations in their production of novel words to fill lexical gaps. The L1 participant children showed a tendency to rely on both vertical (root based) and horizontal (word based) derivations when dealing with sound and weak forms, respectively. By analyzing the participants' productive utterances as well as their errors in comparison with certain adult L1 Arabic speakers' errors (such as slips of the tongue, hypocoristics and aphasic errors), Badry further argues that her data support the psychological reality of the root. Hence, the paper is also a contribution to the on-going debate about the nature of the root.

Finally, Mohammad Alhawary reports on an L2 acquisition study conducted within the latest generative framework of Principles and

Parameters. The study investigated the status of UG access and the nature of second language competence or ultimate attainment in adult monolingual English and French L1 speakers learning Arabic as an L2. In particular, the study examined three most recent hypotheses posited for L2 development**:** the Local Impairment Hypothesis, the Failed Functional Features Hypothesis and the Missing Surface Inflection Hypothesis. Based on cross-sectional acquisition data, analyzed for the feature gender and number agreement in nominal and verbal constructions, the findings indicate that L1 English participants were more likely to have problems with grammatical gender than their L1 French counterparts. The findings are argued to be in support of a modified temporary (access to UG) impairment view, especially in L2 contexts where L1 does not exhibit similar functional categories as those available in L2. The temporary status conclusion is based on the performance of (advanced) participants of both L1 backgrounds who exhibited 100% correct agreement ratios. Alhawary argues that the findings concomitantly lend further support to the role of L1 transfer in L2 acquisition.

THE STRUCTURE OF ARABIC INTONATION
A PRELIMINARY INVESTIGATION

Khaled Rifaat
University of Alexandria, Egypt

1. Introduction

Studies on Arabic intonation have always been an echo of theories and models of intonation dominating at the time of conducting these studies. Although using similar frameworks of analyses is useful from the typological point of view, direct adoption of theories and models set up for languages different from Arabic, mostly European, has obscured the distinctiveness of Arabic intonation.

The literature on intonation does not reveal any implicit reason for assuming the universality of such, Eurocentric, theories and models. In addition, no one of the developers of such theories explicitly claims the universality of his work.

While the 'Universalist' view of intonation, which believes that universal features of intonation outweigh language-specific differences and has been widely accepted for many years, it has been shown lately that the development of 'intonational phonology', among other things, enabled the detection of subtle differences between languages (Ladd 1996). These differences show themselves not only as variations within a similar framework of analysis, but also as formal differences in models and theories.

We expect from a description of Arabic intonation to show its subtle characteristics and hypothesize on a 'theory' of Arabic intonation, a huge target that we hope to partially fulfill in this study.

1.1 *Assumptions about Arabic intonation*

To pick up the thread, we have examined the available literature for any general implicit or explicit hypotheses about the characteristics of Arabic intonation. We have concluded that Arabic intonation system is very 'simple' and plays a minor role in the prosodic system of Arabic. This is perhaps why there is no trace of intonation, and other prosodic phenomena such as stress, in the monumental work of old Arab grammarians (El-Dalee 1999). It is very unlikely that prosodic features have gone unnoticed by old Arab grammarians. The reason for this neglect is implied in Birkeland's (1952) conclusion that Classical Arabic prosodic system depends entirely on the syllabic oppositions.

Recently, El-Dalee (1999) has provided another reason for the irrelevance of intonation to the prosody of Arabic. Given the fact that particles have the function of intonation in some languages, he argued that Arabic, being a particle language, has given much of the meanings conveyed by intonation to particles.

Although there are not enough comparative intonation studies which permit a somewhat formal definition of what a 'simple' intonation system is, it seems plausible to characterize such a system as the one in which intonation is less variable with different meaningful aspects of utterances including constituent structure, discourse status, and attitudes and emotions (we shall call it functional simplicity). More importantly, an intonation system is said to be simple when it contains few elements and rules (we shall call it structural simplicity). This study is concerned only with the latter type of simplicity.

1.2 *Aim*

This study aims at presenting a preliminary description of the intonation of Modern Standard Arabic (MSA). This description should be, hopefully, capable of showing the core characteristics of MSA intonation and verifying claims about its structural simplicity. We limit our investigation to the description of the basic elements and rules of the complete 'intonational sentence' (henceforth Tune, see below for a definition). Textual aspects of intonation are also beyond the scope of this study.

2. Framework of Analysis

Our investigation is based on tone-sequence (TS) analysis (Ladd 1983a) working under the tenet of autosegmental-metrical (AM) phonology of which Pirrehumbert's is the most influential (Ladd 1996). However, some changes are presented with regard to notation, tone types, and tune structure.

In TS analysis, the tune is composed of major F0 events (targets) called pitch accents. The pitch accent is described as a sequence of two tones H (high) and L (low). There are several advantages for using these tones:

- It simplifies description of complex configurations by delimiting distinctive levels to two.
- It resolves or rather 'neutralizes' one of the prominent debates in intonation research, i.e., levels vs. configurations debate (see Ladd (1983b) for a review of this issue). However, this debate is still going in the perception realm and more perceptual studies are needed to specify how listeners hear tone sequences.
- It helps in building a theoretical analysis with different levels of abstraction, which was generally lacking in intonation research.
- Given their alignment with text, tone specifications help in specifying more accurately the surface representation of tunes.

Tone features are not used in this study as underlying phonological representations but rather as surface phonological representations (Hirst et al. 2000). These representations are analogous to a very broad segmental phonetic transcription in which basic allophones are used. Our study is too preliminary to assume abstract intonation features for Arabic.

We start our analysis assuming that structure and rules of "stress group" specification are set up and that the "metrical strength" of stress group nodes in Arabic is delineated (Angoujard 1990).

Declination or "downstepping" is left out of feature specification and treated as an independent variable. There are gathering evidence that declination of tunes is a global feature that has a "grouping" function and not a contextual trait of tonal features (Ladd 1984, 1996).

2.1 *Notation*

We substitute the original notation of TS analysis exemplified by Pierrehumbert (1980) with another notation, which we think is simpler and closer to the standard phonological notational conventions. Notational symbols are as follows:

- ['']: Preceding the tone for tones associated with stressed syllables instead of [*] following the tone.
- [#]: For tune initial and final boundary tones instead of [%].
- [+]: Is used for internal boundary (phrase boundary). Bi-tonal accents are simply represented as combinations, e.g., HL.
- Downstepped tones (e.g., !H) are removed because of the abovementioned viewing of declination as an independent global variable.
- Floating tones are omitted altogether. Our preliminary observations, together with what has been reported by Rifaat (1991), suggest that bi-tonal accents in Arabic are uniform and their tone association with text can be predicted with a high degree of precision.

3. **Material**

A large corpus (approximately 15 hours) of MSA was recorded from the Egyptian radio, one of the main media in which MSA is spoken. MSA composes what is known as the formal variety of Arabic. We are aware of the doubts raised against the feasibility of obtaining a homogeneous corpus representing the formal style of Arabic (Schultz 1981). We believe that these reservations do not apply to our corpus since they were based mainly on simple segmental and grammatical variables, e.g., the use of /q/ sound, vocabulary, and grammatical endings. In addition, the original model of the levels of Arabic (Badawii 1973) was based on general segmental and grammatical features, which we think needs revising if suprasegmental features are considered. As far as intonation is concerned, we suppose that our corpus is homogenous with regard to the formality of spoken Arabic.

MSA as used in the Egyptian radio broadcast contains several styles. The dominant style is the reading or narrative monologue. This style appears basically in news broadcasts and less frequently in some cultural programs. Beside this dominant style, there are also spontaneous or quasi-spontaneous monologues and dialogues found basically in religious and cultural programs.

The corpus of this study contained all of the above styles. The dramatic style, and speeches made at Friday prayers, in parliament and other occasions are excluded. These styles are quite distinct and depart from the rest of the styles as far as intonation is concerned.

The corpus was recorded from two radio stations: the General Program, and the Quran station. The bulk of the corpus was taken from the Quran station for two reasons: first, because MSA is used extensively in it, and second, because announcers and speakers performing in this station are quite aware of the need to stick as much as possible to the formal style of speech, which would maximize the validity and homogeneity of the corpus.

The corpus was digitized and analyzed using 'PRAAT' version 4.49 by Paul Boresma and David Weenink of Institute of Phonetic Sciences, University of Amsterdam.

4. **Results and Discussion**

4.1 *Tune and phrase*

An intonational sentence 'tune' is said to be 'complete' when it conveys a complete intonational meaning. Finality and continuation are the most basic and important of the intonational meanings. The tune can be 'simple' or 'complex' containing more than one phrase.

There are several intonation correlates, which permit a rather formal definition of tune and phrase:

- [HL] pitch accent always denotes a final Tune boundary.
- [LH] pitch accent denotes either a final Tune boundary or a final phrase boundary.
- [H] pitch accent never occurs Tune finally, but may occur phrase finally.
- A Tune is embraced by a uniform trend line (see below). This trend line is, basically, a declined one. Any resetting or a change in direction of the trend line suggests a new Tune or phrase, respectively.

4.2 *Basic pitch accents*

['H]: This is the most frequently occurring accent (see Figure 1 (Appendix I) for an idealized contour of this accent). It occurs in all positions except tune finally. The range of this accent, and all other accents, is a function of the degree of focus given to it. Quantification of the minimum range required to identify the accent as [H] is yet to be

investigated. This accent is always associated with stressed syllables. The peak is aligned with the end of the nucleus of the stressed syllable (Figure 2, Appendix I). Peak alignment is an important feature of Arabic intonation, see Rifaat (1991). Phonetic implementation rules of peak alignment of MSA intonation provided by him apply precisely to our material. Although Rifaat (1991) considered the stressed syllable as the referent point of peak alignment, our preliminary observations suggest that the whole stress group could serve as a more general domain for peak alignment. Taking into consideration that the phonetic model of this issue is still to be investigated how the speaker accomplishes the compromise between his accurate alignment of peaks with both stressed syllables and stress groups, we shall consider the domain of the idealized contour of a pitch accent as the whole stress group.

['HL#] occurs only tune finally in either poly-stress group (Figure 3a, Appendix I) or mono-stress group Tunes (Figure 3b, Appendix I). It is analogous to the British-style falling tone (see Figure 4 (Appendix I) for an idealized contour of this accent). [H] tone of this accent is always aligned with the beginning of the stressed syllable. Accent range and peak projection is also a function of the degree of focus.

4.3 *Marginal pitch accents*

[LH#] is a rise that occurs either tune medially at phrase boundary (Figure 5a, Appendix I) or tune finally (Figure 5b, Appendix I). It occurs less frequently and is associated with 'continuation' tunes for either non-finality, tune medially at phrase boundary, or much less frequently with yes-no questions, tune finally. Figure 6 (Appendix I) shows an idealized contour of this accent.

['L] is a very infrequent accent. Total de-accentuation or flattening of stress groups is an uncommon phenomenon in MSA. However, it can be predicted from stress or accentuation pattern of the stress group. First, it always occurs before or after an over-accentuated, i.e., highly focused, ['H] (Figure 7, Appendix I). Second, there are indications in our data that grouping words into stress-groups is predictable in terms of syntactic or morphological paradigms. For example, particles are usually unstressed and appended to a following noun to form one stress group (see also Figure 7, Appendix I).

4.4 *Pitch accents as peak features*

Pitch accent types can be simply described in terms of peak features. See Figure 8 (Appendix I) for a schematic diagram of pitch accents represented as peak features. Assuming a 'default' or an 'unmarked' accent [H], which has a projected peak aligned with the middle of the stress group, the shift on horizontal or vertical axes would account for all other accent types. Thus, a shift leftward on the horizontal axis results in an early peak or [HL] accent or rightward on the same axis yields a late peak or [LH] accent. A movement downward on the vertical axis generates [L] accent. Since focus is correlated with accent range, it seems that movement on the vertical scale does not result in qualitative change of accent type but a quantitative one. This entails that [H] is perceived as an elevated level tone since [L] is certainly perceived as a level tone. Our preliminary informal experiments in synthesizing Arabic intonation suggest that the previous analysis is perceptually motivated. However, formal experiments are needed to verify that.

4.5 *Boundary tones*

Boundary tones, besides pitch accents, are major elements in the AM description of intonation. They are introduced to account for contours described in the British-style as rising-falling rising. In this contour, we see a change of direction from the major pitch accent. Given that this rise is associated with unstressed syllables and with boundaries, it was thought that there is a different phonological entity called boundary tone. For theoretical consistency, the boundary tone was applied to all boundaries even if the contour direction was not altered such as the simple falling or rising accents.

Our data suggest that there is no need for boundary tones as independent phonological entities in the MSA intonation system. This is based on the following observations:

- In poly-stress group Tunes; initial pitch accents are always [H]. Thus, initial boundary tones are redundant [L] (Figure 2, Appendix I).
- Final pitch accents in poly-stress group tunes, are either simple [HL] or [LH] accents with no major change in direction. Accordingly, boundary tones are redundantly [L] or [H] (Figures 2 and 3a, Appendix I).

- Mono-stress group tunes are always [HL] (Figure 3b, Appendix I) or, hypothetically, [LH], though we have not found the latter type in our data. As such, boundary tones are predictable in terms of the pitch accents.

To sum up, boundary tones in MSA intonation are redundant. They are predictable from the flanking pitch accents and thus are not presented in the underlying representation.

4.6 *Intermediate phrase*

One of the controversial elements of AM description is the existence of phrase boundary and its implications on dividing tunes into major smaller units, i.e., phrases, and on the tone structure of pitch accents. In this analysis, phrase boundary exists if it has a qualitative effect on the preceding pitch accent or on the pitch trend line of the whole Tune. Our data provide evidence for both effects. Figure 9a (Appendix I) shows a phrase boundary correlated with a preceding [H] accent or [LH] accent which replace the basic terminal [HL] accent to denote incompleteness of the Tune. Figure 9b (Appendix I) presents a phrase boundary signaled by a change of the trend line of the Tune from a rising to declining.

4.7 *Pitch range*

Pitch range involves two parameters: global and local. Global range includes choice of a certain 'register' out of the speaker's voice range and direction of Tune trend line. Register is used for paralinguistic purposes and is excluded from the analysis. Local range of pitch accents is responsible for departure of some accents from the trend line depending on the degree of focus exerted on them. Ladd (1996) proposed 'level' and 'span' variables to account for both trend line and focus. Although these two variables seem to overlap in actual Tunes, they are theoretically useful variables and have some empirical evidence. They have been introduced in several models under different terms and conceptions.

4.7.1 *Span*

The increase in the degree of focus is directly proportional to the increase of span of pitch accents. This applies to all types of pitch accents. MSA has a dominant pattern of accentuating the first pitch accent in one-phrase tunes (Figure 10a, Appendix I) or the initial phrase

in multi-phrase Tunes (Figure 10b, Appendix I). Besides this dominant pattern, any pitch accent regardless of its position in the Tune can be accentuated and depart from the decreasing span overall pattern.

Together with increase in span, focus in MSA is sometimes denoted by lengthening of stressed syllables (Figure 11, Appendix I). This phenomenon sheds light on the functionality of intonation 'focus' in Arabic on the one hand and its relevance to stress analysis rather than intonation analysis on the other; issues that require further investigation.

4.7.2 *Trend line*

MSA Tunes show the seemingly universal pattern of 'declination', i.e., gradual decrease of accents level and span or both along the time axis. Our data suggest that declination is one of the major tools to indicate completeness of the tunes.

We did not find any evidence for considering declination as a function of accent context. For example, a sequence of [H] accents can be declined or not depending on variables other than accent structure.

Declination trend line can hold small tunes or larger text to compose long multi-phrase tunes. Declination is basically global. However, it can be compensated for by final accent lowering (Figure 12a, Appendix I).

Declination is very dominant in MSA tunes but is infrequently suspended when continuation is intended. Suspension of declination is achieved either globally or locally by raising phrase accent (Figure 12b, Appendix I).

4.8 *Intonation and style*

Structurally, there are no differences between the intonation of spontaneous and non-spontaneous speech of MSA. The only difference between the two is that spontaneous speech makes a more frequent use of the feature of de-accentuation of pitch accents.

5. **Conclusions**

MSA has a simple intonation system, a system that is seemingly confined to the basic aspects of intonation: tendency of pitch accents to be accentuated, a basic declined trend line tunes, association of non-final or continuation tunes with rising trend line or rising pitch accents and a limited use of pitch accents span to denote 'focus'. In addition, this

simplicity unveils in the relatively small number of pitch accent types and tune structures and in the relatively small number of rules governing pitch accents distribution and combinations. A major reason of this alleged simplicity might be the styles of discourse to which MSA is restricted. Complete spontaneous style of speech with rich and divergent styles is clearly lacking in MSA. Reaching such an elegant generalization about the simplicity of Arabic intonation is very tempting. However, it seems that much work has to be done to exhaust different styles of Arabic to verify this claim.

Appendix I

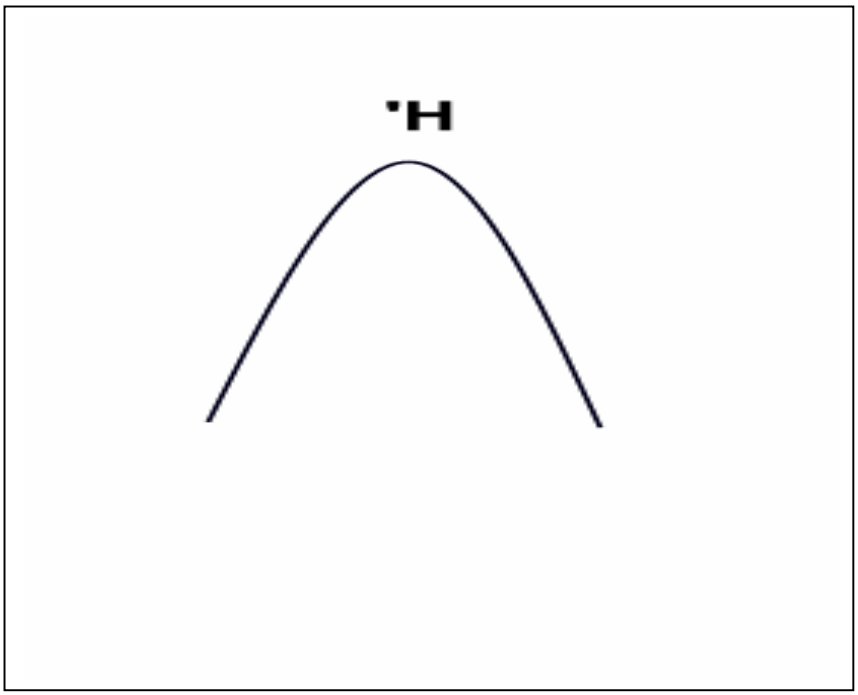

Figure 1
Idealized contour of [H] accent

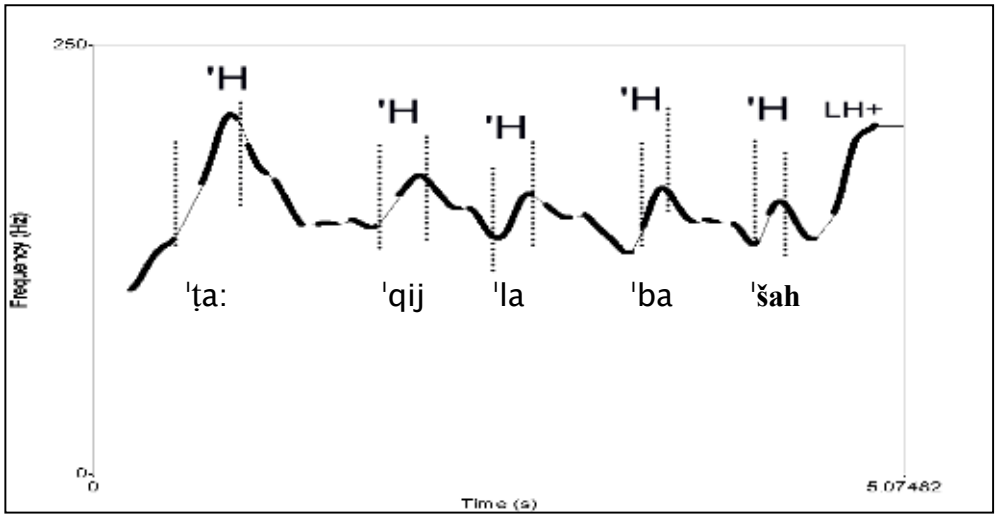

Figure 2

إن الطاقة الحقيقية التي تنبعث في شهر الصوم +
/ʔinna ʔalˈṭa:qata ʔalħaqi:ˈqijjata ʔalˈlati tanˈbaʕiʊu fi ˈšahri ʔalˈṣawm+/
"The real energy that is revived in the fasting month,"
Note. The vertical dotted lines delimit stressed syllables. Stressed syllables are transcribed below parallel to their places in the Tune.

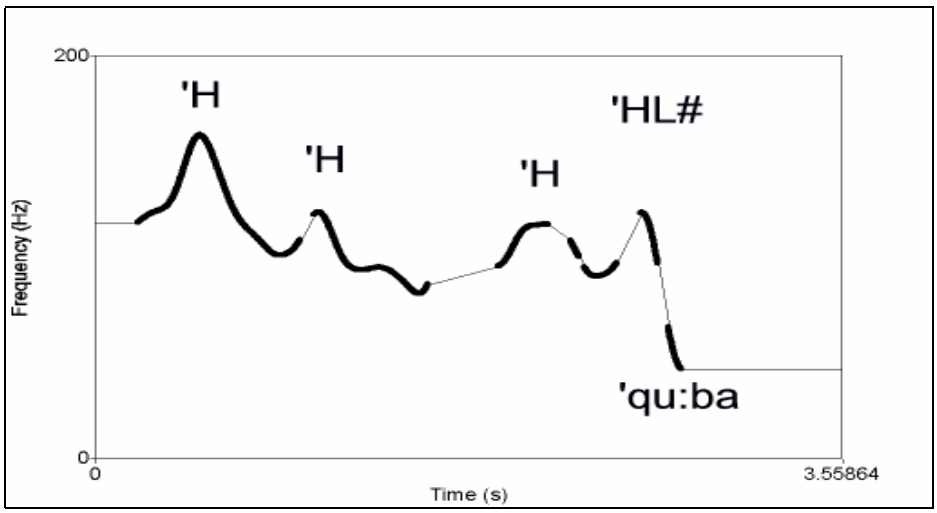

Figure 3a

النوم لأهل الغفلة عقوبة #

/ʔal 'nawmu liˈʔahali ʔalˈʁaflati ʕuˈqu:ba #/
"Sleeping for the inadvertent is a punishment"

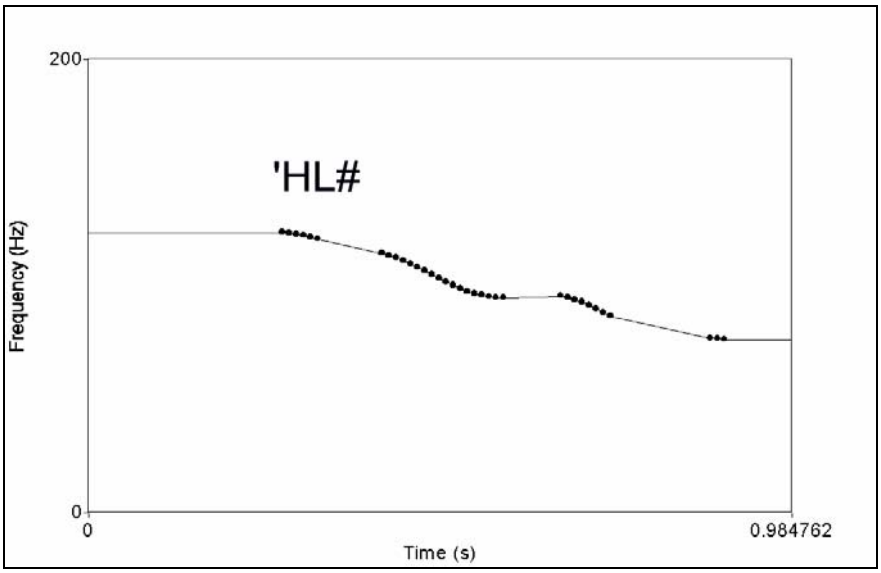

Figure 3b

أهلا وسهلا #

/ʔahlan wa'sahlan #/

“Hello”

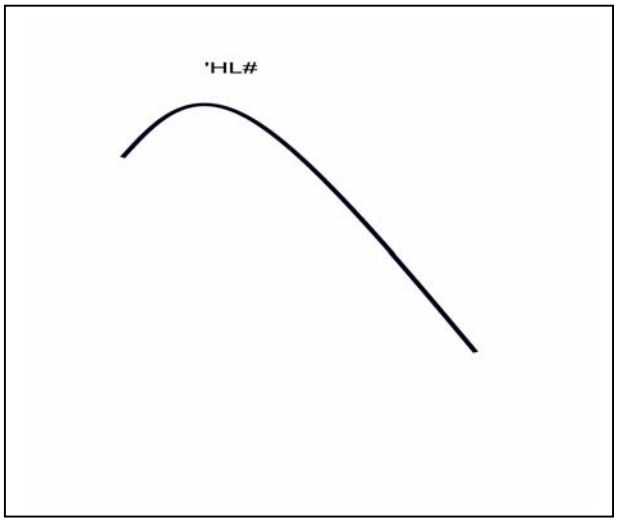

Figure 4
Idealized contour of [HL] accent

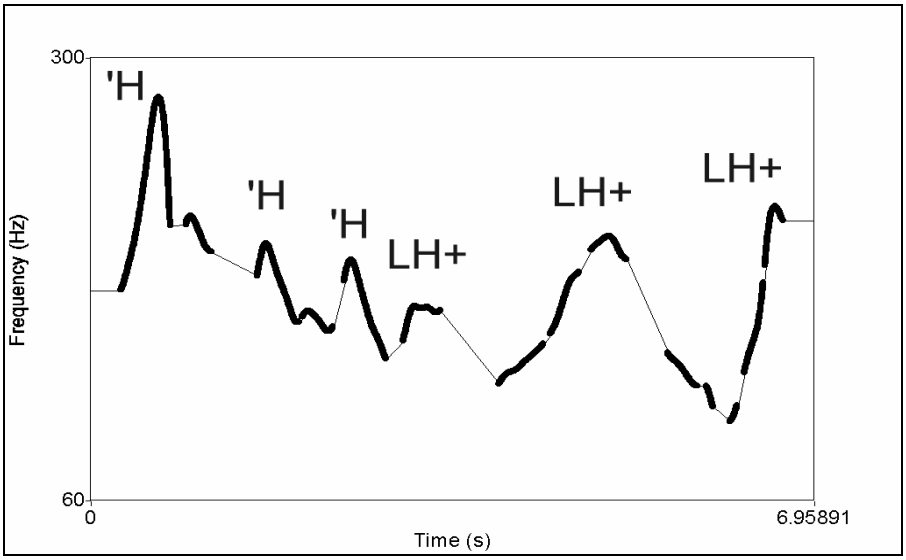

Figure 5a

المنادى إما أن يكون مفردا+ أو مضافا+ أو مشبها به +

/ʔal muʾna:da ʻʔimma ʔan jaʼku:na mufʾradan +ʔaw muʾḍa:fan+ ʔaw mušaʾbbahn bih +/

"The vocative is singular, adjunct, or quasi prefixed"

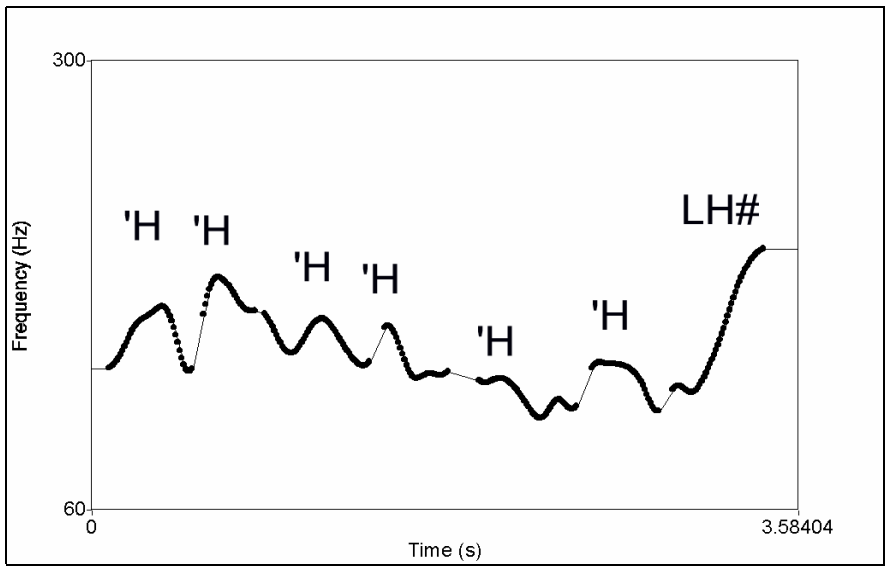

Figure 5b

أليس فينا كلنا حب الحياة والتعلق بها؟ #

/ʔaʾlajsa ʻfi:na ʻkulluna ʻħubbu ʔalħaʾja:ti wa ʔalʾtaʕalluqi ʻbiha #/

"Do not we all love life and cling to it?"

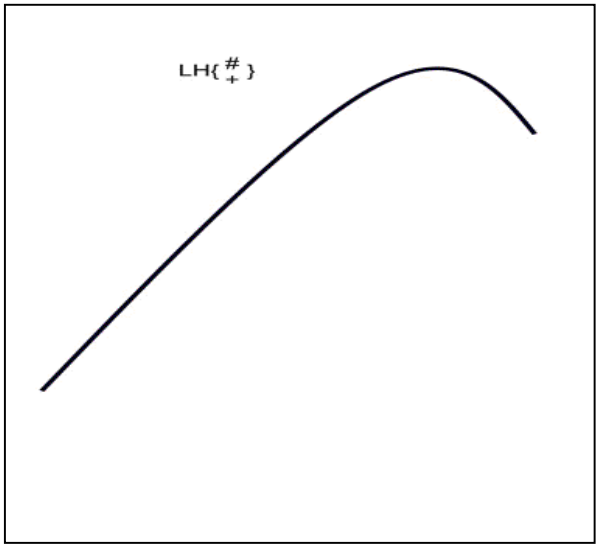

Figure 6
Idealized contour of [LH] accent.

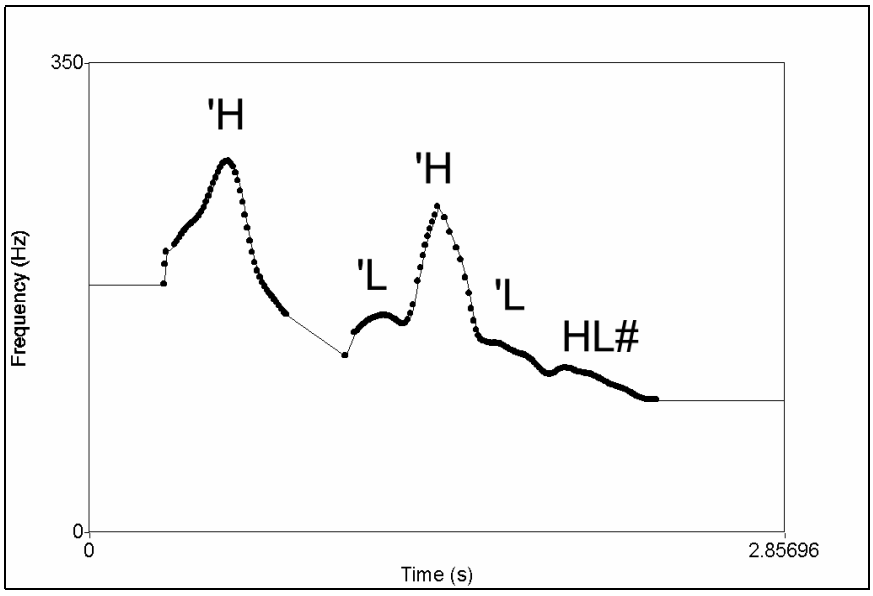

Figure 7

و ماذا لو جاء ولد عاق #

/wa ʻmaːða ʻlaw ʻjaːʔa ʻwaladun ʻʕaːq #/

"What if a disobedient son comes?"

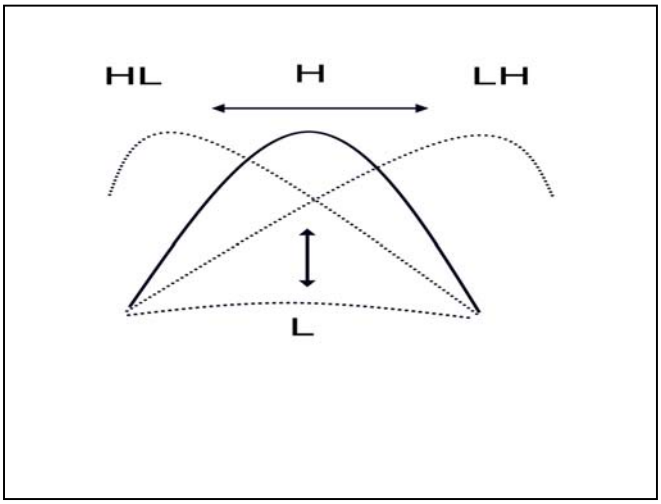

Figure 8
Schematic diagram of pitch accents represented as peak features.

Note. The arrows represent the horizontal and vertical axes. The movement of the peak on the horizontal axis changes the basic accent [H] into either [HL] or [LH], while movement on the vertical axis changes the basic accent into [L]. The basic accent [H] is represented with solid lines and the other accents with dotted lines.

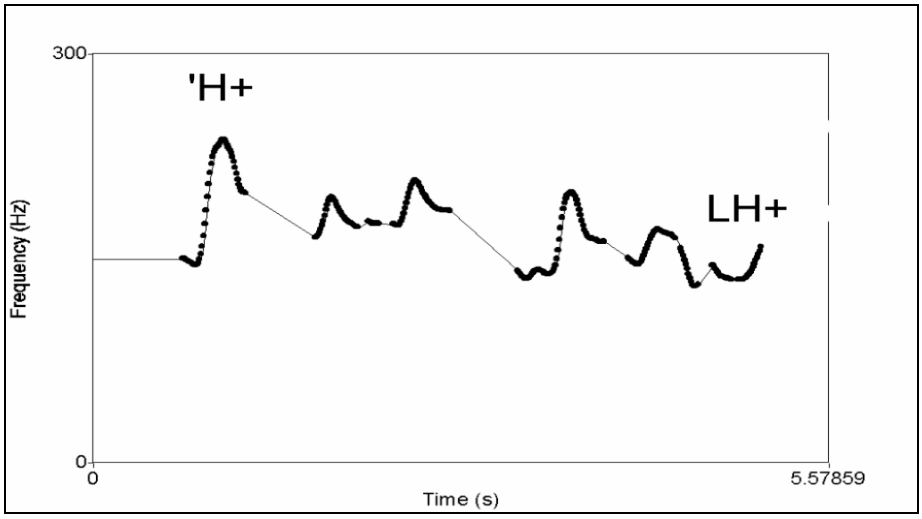

Figure 9a

أولا + إن الإسلام يجيز الثناء على الأموات +

/ʔaw'walan + 'ʔinna ʔalʔis'la:ma ju'gi:zu ʔalθa'na:ʔa ʕala ʔalʔm'wa:t+/

"First, Islam permits praising the dead"

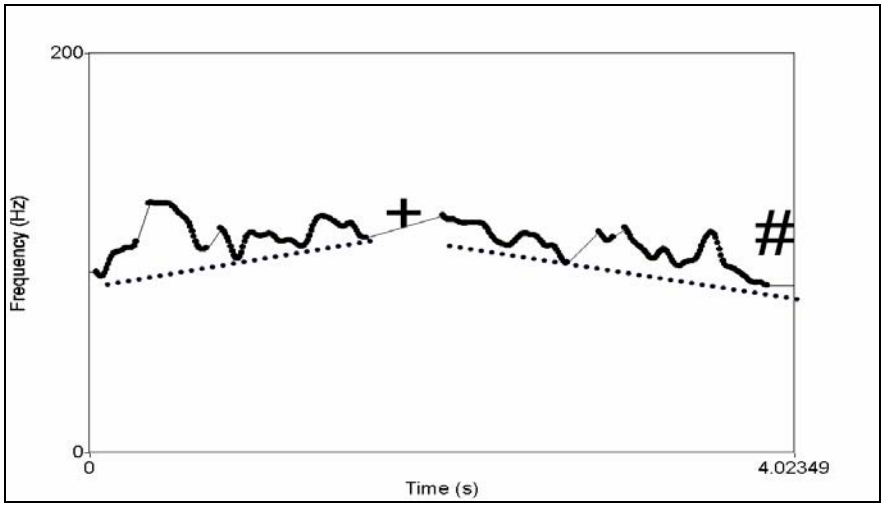

Figure 9b

إذا كان في غير ذلك + كان هذا الطفل هادئا #

/ʔiða 'ka:na fi 'ʁajri 'ðalika + 'ka:na 'ha:ða ʔal'ṭiflu 'ha:diʔan #/

"In another situation, the baby would have been calm."

Note. The dotted trend lines show the change of the level of Tune from rising to declining.

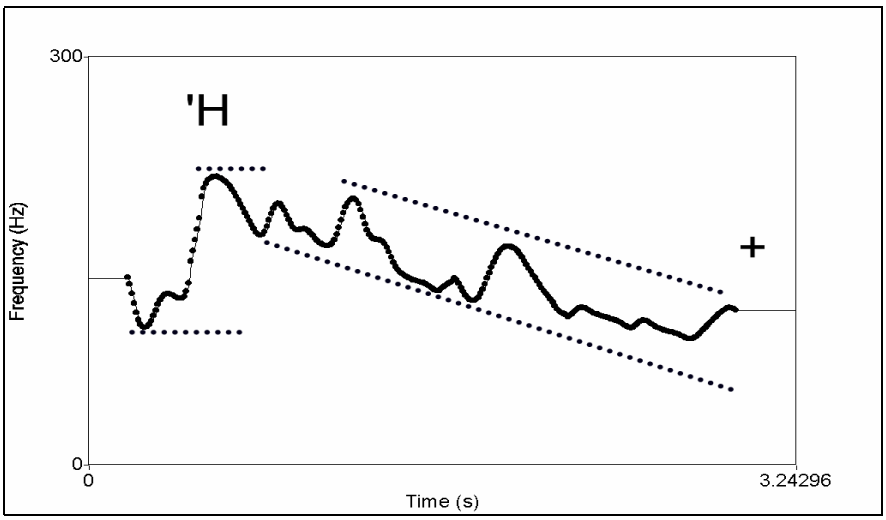

Figure 10a

الإنسان الذي يريد أن يتعالى على غيره +

/ʔal ʔin'sa:nu ʔal'laði ju'ri:du ʔan jata'ʕa:la ʕala 'ʁajrih +/

"The man who looks down upon others,"

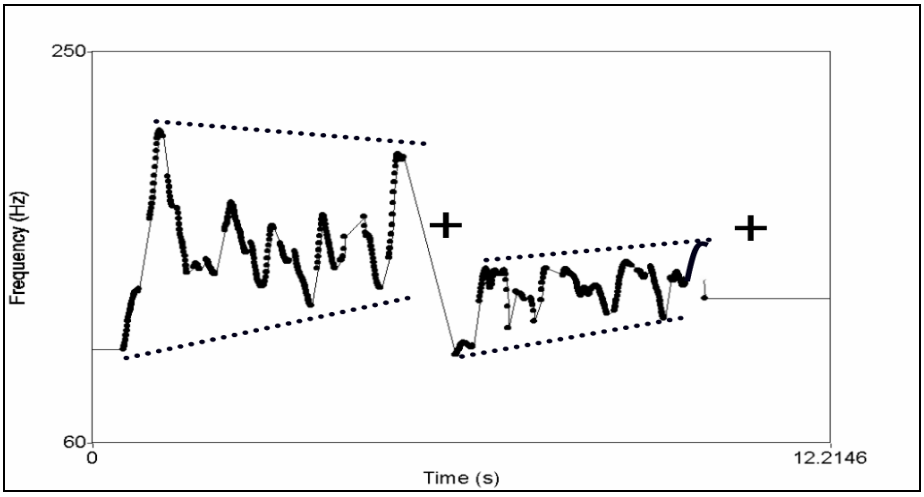

Figure 10b

إن الطاقة الحقيقية التي تنبعث في شهر الصوم ينبغي أن تؤدي إلى طاقة تعليمية +

/ʔinna ʔalˈṭa:qata ʔalħa'qi:qijjata ʔal'lati tan'baʕiðu fi' šahri ʔal'ṣawm +

jan'baʁi ʔantu'ʔaddi ʔila 'ṭa:qatin taʕ'li:mijja +/

"The real energy that is revived in the fasting month should lead to a learning energy"

Note. The dotted trend lines in both figures show the interactive characteristics of level and span of pitch accents.

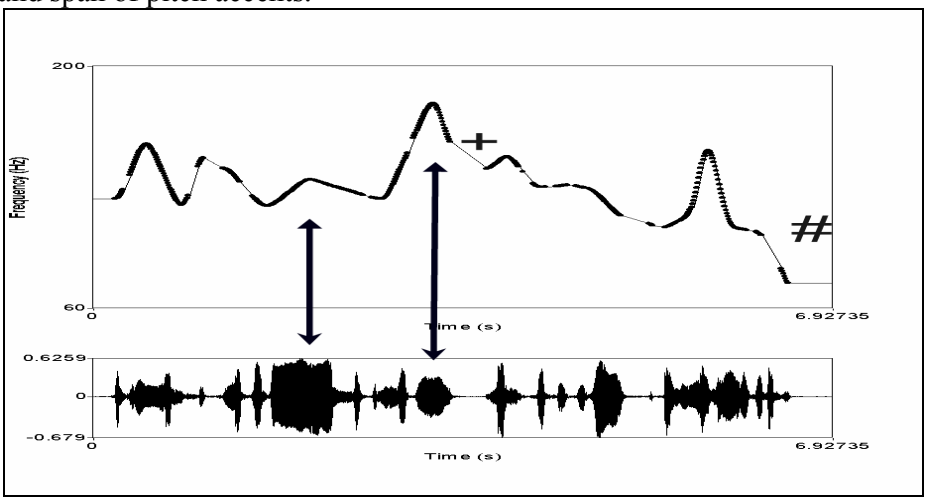

Figure 11

فإن الحكمة ضالة المؤمن + يلتقطها أينما وجدها #

/fa'ʔinna ʔal'ħikmata 'ḍa:llatu ʔal'muʔmin +

jal'taqiṭuha ʔaj'nama waga'daha #/

"Wisdom is the target of the believer; he gets it wherever he finds it."

Note. The arrows align the pitch accents with their places in the waveform; the figure shows lengthening and increase of span as phonetic correlates of focus.

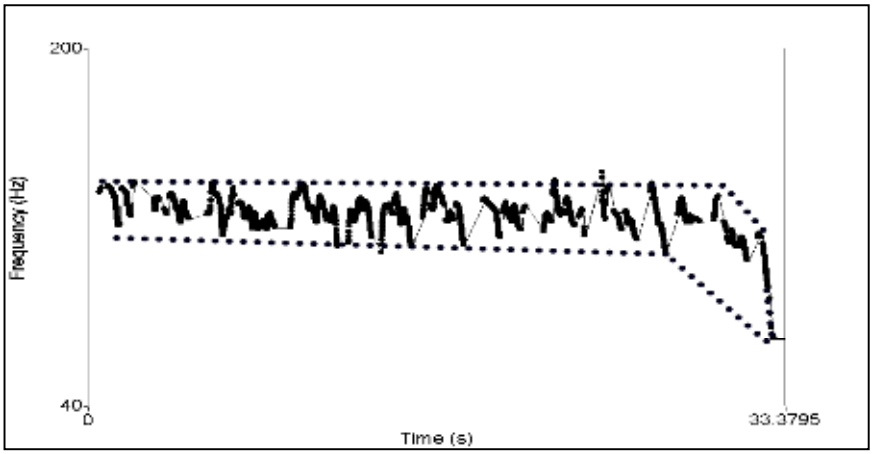

Figure 12a

البرنامج بيقدم شكره للأستاذ الشاعر الكبير محمد إبراهيم
أبو سنه وألف شكر لحضرتك يافندم و سعدنا بلقائك النهارده #

/ʔilbir'na:mig bij'ʔaddim 'šukruh lilʔus'ta:z ʔiš'ša:ʕir ʔilka'bi:r
mu'ħammad ʔib'ra:him ʔabu 'sinna wi 'ʔalf 'šukr li'ħadritak
ja'fandim wi sa'ʕidna bili'qa: ʔak ʔinna'harda #/

"The program thanks the great poet Mohammad Ibrahim Abo Sinna, thanks to you sir and we were happy to have you today."

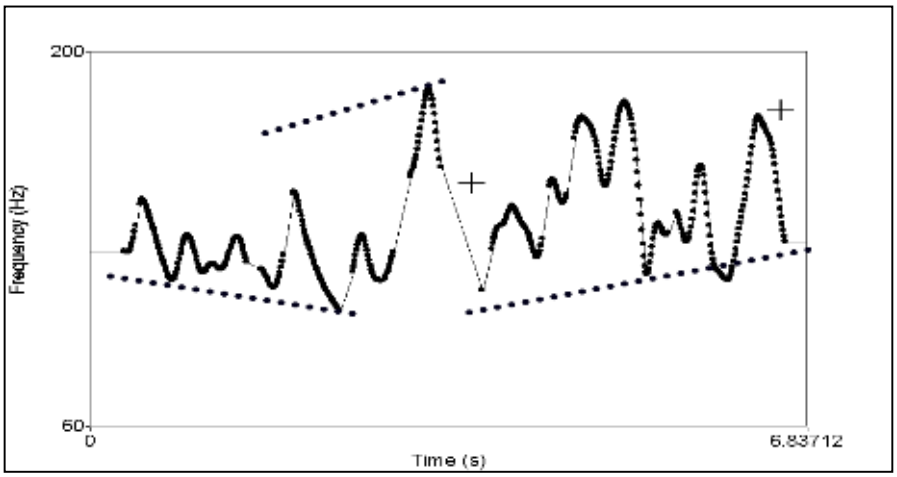

Figure 12b

لكن زوجي ما أن سمع هذا الاقتراح +
عن طبيبي المعالج +

/la'kinna 'zawgi ma'ʔan 'samiʕa 'ha:ða ʔalʔiqti'raħ +
ʕan 'ṭabi:bi ʔalmu'ʕa:lig + /

"As soon as my husband heard that suggestion about my doctor,"

Note. The dotted trend lines in both figures show the interactive characteristics of level and span of pitch accents.

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ACQUISITION OF ARABIC WORD FORMATION
A MULTI-PATH APPROACH [1]

Fatima Badry
American University of Sharjah

1. Introduction

Berko's (1958) pioneering work on the acquisition of English morphological rules demonstrated the productivity of the morphological system and paved the way for subsequent cross linguistic research that documented that, around the ages of two to three, children begin to recognize constituent formal properties and establish relationships between word forms in their lexicon. Later crosslinguistic studies further suggested that structural properties of the input language also influence the type of strategies children develop. Their acquisitional strategies seem to be influenced both by their universal predispositions as well as by the pervasiveness, productivity, transparency, and regularity of the word formation rules in their language. Investigating morphological acquisition of Semitic lang-uages, with their system of consonantal roots and surface patterns combinations in word formation should shed light on such strategies. This study investigates cognitive and typological predispositions employed in the development of lexical derivational processes by Moroccan Arabic speaking children with the objective of providing further insight into the mental organization of Semitic lexicons, the productivity of derivational processes and the psychological status of the root.

[1]I am grateful to comments and suggestions by an anonymous reviewer as well as editorial suggestions by Dr. Mohammad Alhawary, I remain, however, solely responsible for possible errors and unavoidable omissions in this chapter.

2. The Verbal Derivational System in Moroccan Arabic

Semitic lexicons reliance on derivation to form most of their content words makes them of special interest in the study of productivity in derivational morphology. In Moroccan Arabic (MA) as in all other varieties of Arabic,[2] lexicons are based on a system of underlying consonantal roots (usually tri-consonantal, CCC)[3] which are associated with an abstract semantic core. Most content words are formed by combining these roots with specific verbal and nominal patterns (P), themselves associated with specific semantic roles. In Modern Standard Arabic (MSA) which is the variety used in all literacy functions by all Arabic speakers, there are ten productive verbal patterns (PI-X) (Holes 1995) but in most dialects, not all ten are productive although they may all be used with some roots. Seven of the MSA patterns have corresponding MA patterns (see table 1). Pattern 1 (P1) CCeC is generally recognized as the basic pattern and it has several syntactic and semantic functions.[4] P1 verbs can be either transitive or intransitive, and depending on the core meaning of the root, they can convey causative, inchoative or reflexive meanings. Other patterns tend to be more specialized but some may also have more than one semantic function. For example, in MA, the underlying consonantal root *D-X-L*, has the core meaning of "enter", and surfaces in several verbal and nominal patterns such as P1 (basic) *DXeL* "he entered", P2 (causative) *DeXXel*[5] "he brought in", P5 (medio-passive) *tDeXXeL* "he interfered", as well the nominal patterns *məDXeL* "entrance", *məDXuL* "income", *DaXi:L* "intruder", *Da:XeL* "incoming", etc.

[2]There are several dialects of Arabic spoken in the various geographical regions of the Arab world and each referred to by the country in which it is spoken. They are all closely related to the Modern Standard Arabic variety used by all Arab speakers in literate activities.

[3]C is used throughout to represent the consonants in the root template

[4]To distinguis2h between reference to patterns in MSA and those in Moroccan Arabic, Roman numerals are used for MSA and Arabic numbers for Moroccan Arabic.

[5]The transcription adopted here is very broad. MSA short vowels are either dropped or reduced in MA. /e/represents any of the reduced short vowel and in many cases could be transcribed as a schwa.

Table 1: Verbal derivations in MSA and MA

Pattern	MSA	MA	Gloss	Semantic function
PI/P1	CvCvCv* DaXaLa** ŠaRiBa KaBuRa	CCvC DXeL ŠReB KbeR	 “enter” “drink” “grow”	Multiple
PII/P2	CaCCaCa DaXXaLa	CeCCeC DeXXel	 Bring in	Causative
PIII/P3	Ca:CaCa Ṣa:ĦaBa	Ca:CceC Ṣa:ĦeB	 “befriend s.o.”	Conative/reciprocal
PIV/P4	ʔaCCaCa ʔaDXaLa	-------	 “bring about”	Causative
PV/P5	taCaCcaCa taDaXxaLa	tCeCceC tDeXxel	 “get (oneself) involved/interfere”	Reflexive/medio-passive
PVI/P6	taCa: CaCa taDa:XaLa	tCaCeC tDaXeL	 “interact”	Reciprocal
PVII/ P7	ʔinCaCaCa ʔinʕaKaSa	-------	 “reflect”	Medio-passive
PVIII/P8	ʔiCtaCaCa ʔiʕtaRaḌa	-------	 “block/obstruct”	Reflexive
PIX/P9	ʔiCCaCca ʔiĦMaRra	CCaC .ĦMaR	 “become red”	Inchoative
PX/P10	ʔistaCCaCa ʔistaʕRaḌa	steCCeC staʕReḌ	“review/ present”	Multiple

* Consonantal roots are represented by capital letters

**Verb citation forms are in 3rd person, masculine, singular.

MA has only one P1 form instead of the three MSA forms because of the phonological process of neutralization of the contrast between the MSA short vowels a-i- u which distinguish the three verbal forms of PI (CaCaCa, CaCuCa & CaCiCa). In addition, MSA passivization of PI verbs by short vowel alternation, CuCiCa for all three forms, is lost in MA due to this neutralization. Together with the elision of the initial glottal stop, these processes have resulted in fewer patterns being productive in MA, in comparison to MSA. Specifically, MSA patterns PIV (causative), PVII (reflexive) and PVIII (passive) are not used productively in MA (Harrell 2004). MA uses only one pattern for each of the above mentioned semantic functions, namely, P2 for causatives and P5 for reflexives, although a variant of P7 is used in some regions

of Morocco (Harrell 2004). Moreover, MA uses P2 much more productively since it has lost other MSA causative patterns.[6] Overall, however, the function of the verbal patterns in MA is roughly the same as the corresponding MSA verbal patterns.

This system of semantic core and derived patterns in Arabic and other Semitic languages provides a good area for the study of the interrelation between the universal conceptual and linguistic development, the role of typological biases in acquisition, and presents a promising ground for the investigation of the productivity of word formation devices and directionality of derivation in the acquisition of the Arabic lexicon.

3. Universal and Typological Paths

Slobin's (1973) seminal paper on the role of cognitive prerequisites in language acquisition, set the stage for a whole new perspective in studies of language development. Slobin argued that based on observed regularities in acquisition crosslinguistically, one can conclude that children must possess certain operating principles (OPs)[7] that enable them to develop the grammar of their language. These OPs are strategies based on perceptual and cognitive prerequisites which are universal and which guide grammatical development. Before the child is able to talk about location or causation, for example, he needs to have first developed the prerequisite concepts. Slobin's approach was taken up by many psycholinguists (e.g., Johnston 1985, Peters 1985, Bowerman 1985) and used to explain observed developmental stages in acquisition of typologically diverse languages (De Villiers & De Villiers 1985 for English; Clark 1985 for French; Berman 1985 for Hebrew; Toivainen 1997 and Dasinger 1997 for Finnish, Estonian and Hungarian; Stephany 1997 for Greek; and MacWhinney 1985 for

[6]Moroccan Arabic has word forms based on the MSA patterns not included here but these words seem to be borrowed from MSA and are usually pronounced with an MSA phonology. The increasing interaction between dialectal and MSA forms in educated speech may bring back the obsolete patterns in the dialects and revive their productivity.

[7]I am avoiding the issue of innateness, language specific or general learning strategies here. At this point the focus is on empirical evidence which lends support to the universality of these strategies regardless of whether they are innate or learned through universal capabilities.

Hungarian).[8] Later reformulations of the operating principles approach took into consideration processes that are typologically predominant in the language to be acquired as playing a role in either sharpening and strengthening these universal predispositions (Slobin 1997a) or causing them to wither away when they are not utilized in the particular language being acquired by the child. For instance, Slobin (1997a) suggested an operating principle which he identified as *OP strengthening*. Relying on this OP, the child is guided in his acquisition of the grammatical rules of his language by the following strategy*: Whenever an attempted solution succeeds, apply the same strategies to similar problems.* This strategy is supported by evidence from several morphological domains. Dasinger (1997) reported that children learning Finnish, Hungarian and Estonian were engaged in a type of verbal play that suggests that they are aware of the importance of vocalic length. In addition, from very early on, children are guided by a universal principle that phonetic segments can be moved around systematically. The child KNOWS that linguistic units, probably defined by intonational contours, are in fact combinations of similar phonological elements (either syllabic or segmental units). This initial knowledge leads him to look for consistencies in ways in which these phonological elements are put together thus deriving information about what constitutes a possible word in his language. At more advanced stages of language acquisition, paying attention to phonological combinations leads the child to make predictions about different word classes based on formal structures.

Other OPs, such as those classified by Slobin (1985a) under "entering and tagging information in storage" are likely to be strengthened by the root/pattern combinations of Semitic lexicons. These include the following two OPs which must be very useful for Arabic and Hebrew speakers in discovering productive word formation processes in their language:

> OP (STORAGE): CO-OCCURRENCE. For every segment unit within an extracted speech string, note its co-occurrence with any preceding or following

[8]The five volumes of *The crosslinguistic study of language acquisition* edited by Dan Slobin. (1985, 1992, 1997) are devoted to this approach being applied to studying the acquisition of 28 languages from about 16 families.

unit and store sequences of co-occuring units, maintaining their serial order in the speech string.

OP (STORAGE): UNIT FORMATION. If you discover that two extracted units share a phonologically similar portion, segment and store both the shared portion and the residue as separate units. Try to find meanings for both units.

Similarity, or lack of it, in phonological structure has also been used to explain the ease or difficulty in acquisition of formal paradigms in other languages such as English past tense, and French and Spanish irregular verb conjugations. In a study of errors in irregular past tense forms in English, Bybee & Slobin (1981) found that the subjects tested made generalizations about different classes of irregular verbs based on phonological properties. Data gathered from preschoolers, eight to ten year olds, and adults' production of English irregular verbs, indicated that these forms were memorized and stored in the lexicon. However, speakers seemed to organize irregular verbs according to what the authors called "schemas".[9] According to Bybee and Slobin (1981), "the task of matching a past form with a base form must depend upon both semantic and phonological shape", that is, the child must recognize that "break" and "broke", for example, share the same core meaning and that the difference in form expresses a different tense of the same core meaning. In particular, the identical consonantal structure must be a facilitating factor in this task. The authors arrived at these conclusions analyzing the different percentages of errors of regularization produced by preschoolers relative to the phonological structure of the verb. For example, in verbs with both initial and final consonants or clusters such as "break", "sing", and "bite", regularization ranged between 32% and 55%, whereas in verbs with initial consonant or cluster only such as "blow", "know", and "see", regularization reached 8%. The effects of phonological distance on storage and access of irregular verbs was also observed with adults tested in this study. Similar conclusions were arrived at based on French acquisition data (Clark 1985). In French the irregular verb *prendre* "to take" loses its two final consonants and

[9]A 'schema' is defined as "a statement that describes the phonological properties of a morphological class (in this case past tense). 'Schemas' differ from 'rules' in that they do not relate a base to its derived form but limit their description to the outcome class.

undergoes vocalic changes when it is conjugated. For example, in the present perfect, it has the form *pris* (participial form); in the present tense it has the forms, *prends* (d & s are not pronounced), for the first person singular, *prenons* for the first person plural, etc. Clark found that children commonly created the form *prendu* in an apparent attempt to preserve the consonantal skeleton of the infinitive, in the conjugated forms.

By the end of the 20th century, this strong universal cognitive basis for linguistic development was questioned by some of those same researchers that had championed it earlier (e.g., Slobin 2001, Carey 2001). The ever expanding research on typologically different languages eventually revived the interest in the Whorfian hypothesis which proposed that the type of language being acquired influences the how, when, and what gets acquired. In a remarkable change of perspective, Slobin declared that "children come to formulate experience for linguistic expression in quite different ways depending on the type of language they are learning…. each type of language fosters its own modes of 'thinking for speaking'" (2001:442).

The role of the input and its nature had been recognized earlier by many psycholinguists who had adopted a more interactionist approach and pointed out that the social interactions of the child with his environment were essential and affect the route of acquisition (see for example, Berko-Gleason 2001, Tomasello 1992). These researchers called for both universal and innate predispositions for language and the input received from the environment as shaping the course of language acquisition. Another explanation which attempts to account for the differences found in the way different languages categorize world experiences was proposed by Schlesinger (1979). He suggested that any conceptual domain should be regarded as a continuum rather discrete categories and that different languages lexicalize different points in the continuum while the conceptualization of the domain is universal. English for example, has several words to express the concept of "cutting" depending on what is being cut and how it is cut. One slices bread, shreds paper, dices or chops vegetables, crosses the street, cuts or trims hair, severs relations, and so on.

In Moroccan Arabic, all these activities are referred to with one word *QTeʕ* "cut". This does not mean that English and Moroccan Arabic speakers have different conceptualizations of the act of cutting.

English speakers readily recognize that all the lexical items referred to above label the concept of "cutting".

In summary, various positions in the literature seem to converge towards a more inclusive approach that recognizes that children come to the task of language acquisition with certain universal conceptualization predispositions which are shaped by the social environment and language specific features all impacting the processing and organizing of the linguistic system being acquired.

In Semitic lexical acquisition, the salient, regularly occurring, word formation processes lead the child to develop a typological bias which favors derivation over other word formation processes such as compounding or periphrastic constructions. The application of the OPs, mentioned above, by Arabic and Hebrew speaking children must receive maximum strengthening from their input, which eventually leads them to pattern discovery through horizontal derivation, and root extraction leading to vertical derivation. Based on her investigations of the acquisition of Moroccan Arabic verbal and nominal patterns, Badry (1982, 1983) concluded that when children begin to analyze verbal forms (around age 31/2), their initial strategy appears to be to identify different verbal patterns based on both semantic and formal similarities. For example, the child notices that verbs sharing the semantic component of "cause" also share a similar phonological pattern, namely, CeCceC as in *HeRreS* "break" *WeKke*L "feed", *LeBbeS*[10] "dress someone". These semantic and formal similarities help the child extract the formal causative pattern CeCceC and enable him to perform horizontal derivations from one pattern to another. These conclusions were supported by evidence from children's performance with nonce words. Moroccan children found it difficult to derive verbs from nonce forms while they had no problem deriving novel forms filling lexical gaps from meaningful basic patterns. The errors with nonce forms decreased with age. Older children (7 year olds) were gradually able to use information carried by phonological structure of surface forms to relate various surface forms to an underlying consonantal root. For example the child notices that forms like *LBeS* "wear", *LeBbeS* "dress someone" *meLBu:S* "worn" *La:BeS* "dressed" all have to do with clothing and they all share the same three consonants *LBS*. Noticing

[10]Consonantal roots are represented with capitals.

these similarities serves as a semantic and morpho-phonological bootstrapping that enables him to formulate vertical derivational rules which would generate all sorts of surface patterns from a common consonantal root. Such explanation is also supported by data from Hebrew (Clark & Berman 1984). Also, Berman's analysis of children's lexical innovations in Hebrew revealed that when Hebrew speakers were asked to come up with innovative (non conventional) verb forms from nouns and adjectives, children and adults' performance revealed that they were able to extract consonantal roots and apply the appropriate verbal patterns to coin new verb forms (Berman 1993, 1999). In addition to underlying conceptual principles, Clark (1993) suggested that in acquiring their lexicon, children, from a relatively early age (age 2), are guided by two general assumptions about language, which she identified as the principles of conventionality and contrast. She argued that children must come to the task of acquiring word meanings by assuming that "words contrast in meaning, that established words pre-empt the use of others that would be synonymous with them, that unfamiliar words fill gaps, and that innovations can be coined when needed, again to fill gaps". To be able to do so children "must analyze the structure of familiar words into roots and affixes, and map the meanings onto each one". Such analysis is affected by the two factors of transparency and simplicity (1993:108). A word is transparent if the meaning of its constituents is clear and known to the child; if there is a one to one correspondence between form and meaning. It is simple when its constituents (root and affixes undergo no change in form. The data to be presented below support the hypothesis that, as the child is exposed to more input from the language spoken around him, his general underlying conceptual principles are shaped into structured typological biases which alert him to the more productive rules and salient features of his language.

4. **The Study**

Acquisition data were collected from forty Moroccan boys and girls between the ages of 3;5 and 9;9 from four grade levels, kindergarten, first, third and fourth grades. The selection of this age range was based on findings from previous work, that revealed that Arabic and Hebrew speaking children begin to use the derivational system productively around age three and that they continue to reorganize their mental

lexicon using both vertical (deriving from the root) and horizontal (deriving from other surface patterns) derivations well beyond preschool years. The present study discusses the types of strategies used by children in lexical derivation and attempts to assess the influence of typological biases in lexical innovations and word formation.

5. **Materials and Procedures**

Data to be analyzed were collected by means of two elicitation procedures: story-retelling and the verbal pattern derivation production task.

5.1 *Story re-telling*

A story (see appendix 1) with actions described by a total of 45 surface forms derived from thirty-one roots was used: 28 verbs in the basic pattern (P1), 11 in the causative (P2), three in the reciprocal (P6), and three in the middle-voice (P7). Of the 28 P1 forms, 11 appeared in other derived patterns as well. Each child listened to the researcher tell a picture illustrated story which he/she is expected to recount with the help of the same pictures.[11] The instructions used to introduce the story are as follows:

> ɣædi nʕæwed lək waħəd lqiṣṣa dyal waħəd lweld, smiyyətu karim, u xtu kbər mənnu, smiyyəthæ næbilæ, mʕæ walidihum, melli kayfiqu fəṣbaħ u kayweždu rashum baš yəmšiw –əl-mdrasa. ɣædi təsmeʕ liyæ məzyæn baš teqder tʕawed hæd lqiṣṣa l-----. u-ɣædi nseždluha baš tesmeʕ rasek fə-ssežælæ.
>
> "I am going to tell you a story about a little boy named Karim and his older sister Nabila with their parents as the children are getting ready to go school. Listen carefully because I would like you to retell the story to ___ (name of friend) and we will record it so that you'll have a chance to hear yourself on tape."

The researcher then proceeded to tell the story pointing to the pictures illustrating the activities described. Probing questions such as *aš kæy*

[11]I would like to thank E. Pardo for offering me her pictures and Fadia Salfiti for illustrating the story.

diru hnæ? "what are they doing here?" pointing to the pictures, are used to elicit more speech especially from the youngest children.

5.2 *Verbal patterns production*

The verbal task included four out of the six patterns used productively in Moroccan Arabic verbal derivations. These are the basic pattern (P1: CCeC), the causative pattern (P2: CeCCeC), the reciprocal pattern (P6: tCaCeC), and the medio-passive pattern (P7: tCeCCeC). A total of 30 pictures illustrating the actions referred to by the task items were sequentially presented to each child (see appendix 2). The targeted forms were novel forms not conventionally used by adults but possible semantically and formally derivable patterns. The researcher described each picture using a verb in either the basic (P1) or causative (P2) patterns (in all, 24 P1 forms and 6 P2 forms were used), then asked the child a question which required a response containing the same verbal root in another derived pattern. The responses targeted were ten causative (P2), ten reciprocal (P6), and ten medio-passive (P7) patterns. To familiarize children with the task at hand, three additional pictures were used during a practice session immediately preceding testing. Three types of questions were used to elicit the targeted verbal patterns. For causatives, the probe was "What is x doing to y?" For reciprocals it was "What are they doing to each other?" and for passives, the question was "What has happened to x?" For example, the researcher would show a picture of a girl in a bathtub with her mother bathing her and then would say:

> had I bent ka-tʕu:m (P1) "this girl is bathing"
> aš ka-t-di:r-lha mamaha? "what is her mother doing to her?"
> Targeted response: ka-t-ʕuwwemha (P2) "she is bathing her" (from weak root ʕ*wm* "bathe").[12]

Each child was tested in three separate sessions over a period of seven weeks. The linguistic responses of the subjects were audio-recorded and supplemented by field notes when possible.

The lexical items selected for use in the two tasks came from a word list compiled from children's spontaneous speech samples obtained during earlier work (Badry 1982). Additional criteria for

[12]Weak roots are roots where one of the consonantal positions is a glide.

selection took into consideration the inclusion of verbs from weak/irregular roots. Specifically, roots with either a glide or a geminate consonant (e.g., *BWS* "kiss" and *ŽRR* "pull") made up roughly one third of all roots used in the present research. The inclusion of irregular roots was motivated by findings from pilot work that showed that most errors occur in the derivation of patterns from irregular roots. Such errors expose the strategies children may be operating with to segment and construct derived patterns.

6. **The Results**

6.1 *Story re-telling*

Three year-old children showed better attention to and retention of activities that had explicitly stated agents. They remembered scenes with agents better than agentless events. They hardly used any middle voice P7 verb forms and extensively used the causative P2 verb forms in appropriate but non-conventional ways. The causative pattern was used more frequently by the children than in the adult input itself. Their retelling also included a high frequency of the basic pattern which corresponded to its high ratio in the adult story. However, while verbs in the basic pattern outnumbered the causatives by a ratio of almost 3 to 1 in the story as told by the researcher, in the younger children's retelling both patterns were used almost equally, and in few cases the causative patterns even outnumbered basic pattern verbs. By age five both basic and causative patterns were used equally. This is an indication that although children are becoming aware of adult conventional use of the basic P1 to mark multiple semantic roles, explicit marking of agentivity seems to still dominate over conventionality. By seven, the basic P1 is used predominantly showing a progression towards the adult's heavy reliance on P1 as the unmarked pattern in support of Clark's (1993) conventionality principle. Length and verb frequency increased with age as indicated by percentages of each verb pattern presented in Table 2.

Older children's (9 year olds) stories included reciprocal patterns to express predicate relations of reciprocity while reflexive, agentless, and causative notions were expressed either by the appropriate corresponding patterns or by an analytical phrase consisting of P1+ reflexive pronoun for reflexives, a participial form for middle-voice, and a transitive P1 for causation. These preferences for P1 and

periphrastic constructions instead of derived specialized patterns correspond to conventional use in adult speech. Overall, in the story retelling task, children at all ages tested used a variety of verbal patterns, but the basic and the causative patterns had the highest frequency among the younger groups (KG and 1st grade). The 7 and 9 year olds used reciprocal, reflexive and middle voice patterns but relied more on the basic patterns to express a variety of semantic relations. The younger children's stories were generally shorter and as a result had fewer verbs.

Table 2: Mean percentages of verb patterns in story re-telling

Pattern	KG	Grade 1	Grade 3	Grade 4	Adult story
P1	33	39	43	45	51
P2	41	38	36	36	19
P5	13	12	12	06	09
P6	05	04	04	06	06
P7	06	07	05	07	15

The roots listed in Table 3 were derived in more than one surface pattern. These derivations tended to increase with age. The majority of the derived patterns among the 3;5 year olds were in the causative (P2) which, sometimes, was used erroneously in place of the conventional basic P1 or middle voice P5. For example, younger children used P2 *HəRRSu* "he broke it" instead of (P5) *tHəRRes* "it broke" and (P2) **ka-tWəKKeL buħdha* "she is feeding by herself" instead of (P1) *ka-t æ:Kul* "she is eating". By grade 3 the basic pattern regains its predominance while all other patterns are also produced.

Table 3: Derived patterns tokens from 7 frequent roots in the story

Root	Core meaning	KG	Grade 1	Grade 3	Grade 4
FYQ	wake up	2	2	2	7
NWD	Get up	--	1	4	--
ʃKL	Eat	1	3	9	9
LBS	Wear	6	8	9	9
ŠRB	Drink	2	1	2	1
ʃWM	Bathe	--	1	1	3
HRS	Break	--	1	--	2

6.2 *Verbal patterns*

Children's responses were grouped as pragmatically correct or incorrect responses. Correct responses included patterns that matched the targeted form in both root and pattern, responses that were in the targeted pattern but from a synonymous root, and responses that were both semantically and formally appropriate but not in the target pattern nor from the input root. For example, instead of the targeted P6 *kæy-tNæTFu* "they are pulling each other's hair" some children responded *kæy-tQæMŠu* "they are fighting". In place of the targeted P2 *XeWweFhæ* "he frightened her" they responded with P1 *XLeʃhæ* "he scared her". Incorrect responses included repetitions, irrelevant responses or no response at all. Also considered incorrect were responses with periphrastic constructions such as *kæt-gul lihæ* "she tells her" + targeted verb in imperative form. For example, *kæt-gul lihæ ʃuMi*: "she tells her bathe" or the verb *DæR* "he did" with a deictic to demonstrate the action, *DæRet- lihæ hækka* "she did this to her".

The analysis of the results from the verbal patterns production task shows that verbal patterns become productive at different stages in linguistic development. By age 3;5, the causative pattern P2 is already stabilized. It is followed by the reciprocal P6 and medio-passive P7 patterns. As Table 4 shows, the use of the reciprocal pattern started out higher than that of medio-passives but its rate of increase was slower compared to the latter which reached 60% by age 9. At the same time, the percentage of reciprocal patterns dropped by 8%.

Table 4: VPPT: Mean percentages of correct pattern responses

	KG	**Grade 1**	**Grade 3**	**Grade 4**
P2 Causative	62%	62%	63%	63%
P6 Reciprocal	22%	35%	65%	57%
P7 Medio- passive	07%	33%	52%	60%

Statistical analysis revealed an overall main effect of age but the rate of increase from one age group to the other varied according to pattern. Unlike causative patterns percentages which remained constant across all age groups, the rate of acceleration in correct reciprocal and medio-

passive patterns responses was different, with the biggest jump occurring between ages 5 and 7.

An analysis of variance conducted on the correct pattern categories revealed an overall main effect of age (F (df=3)) = 12.36, p<.00), and pattern (F (df=2 = 16.65, p<.00), as well as a significant interaction of age with pattern (F (df=6) = 4.23, p<.00). To determine where these differences lie, several two-way contrasts of age and patterns were performed. Results indicated that across age groups the difference between causative (P2) and medio-passive (P7) patterns was statistically significant (F (df=1) = 35.05, p<.00). The difference between P2 (causative) and P6 (reciprocal) was also significant (Fdf=1) = 19.22, P<.00). There was no statistically significant difference, however, between P6 and P7.

The same main effects were found when a within subjects analysis was performed on the correct pattern responses obtained from KG (age 3;7) and first grade (age 5;5) children. On the other hand, although similar trends were observed in results from third (age 7;5) and 4th graders (age 9;5) they did not reach statistical significance.

Third and 4th graders substituted the P1 pattern for targeted causative or reciprocal patterns often demonstrating their awareness of conventional use at the expense of the productivity of the system. Their P1 responses were derived either from the same root given in the input or from a different but pragmatically appropriate root. For the targeted medio-passive, they sometimes responded with participial forms, also pragmatically correct in adult speech, to express resultative states For example: for the targeted P6 (reciprocal to describe a picture where 2 children are washing each other, responses included: (P1) *ka-y-ɣəSL-u* "they are washing" rather than the targeted novel form (P6) *ka-y-tɣæSL-u "they are washing each other*".

Other responses were derived from roots different from those in the input. For instance, for the targeted *(P2) ṬiYyeĦætu* "she dropped it" some 7 year olds responded in P1 *RMætu* "she threw it".

The P7 medio-passive was replaced with participials. For example for the targeted P7 form *tWeSSX-u* "they got dirty", many children responded with the participial form *mWeSSXi:n* "they are dirty".

The percentage of inappropriate responses was particularly high among KG children. Errors made up 28% of elicited causatives, 70% of elicited reciprocals, and 77% of elicited medio-passives. A large

proportion of these were repetitions. At all ages tested, repetitions were relatively higher for targeted reciprocal than either the medio-passive or the causative patterns.[13]

7. **Discussion**

The results support the hypotheses that the Semitic lexicon is organized around an underlying consonantal root, which gains psychological reality for Arabic speaking children around the ages of three to four, and that children use both horizontal and vertical derivational processes productively to generate new words. To claim that the root is a psychological construct in the mental representation of the Arabic speakers' lexicon does not entail that every time a speaker uses a word form, he calls on the root construct to derive his forms. Rather, speakers resort to it whenever they are faced with a new task such as coming up with novel words or dealing with words from weak roots.

The developmental progression found in the Moroccan Arabic study is, by and large, similar to that reported by Berman (1985) for Hebrew speaking children with the exception of the delayed productivity of the middle voice. However, this overuse of the causative pattern at the expense of the middle voice supports Slobin's (1979) notion that children's attention is drawn to more "prototypical transitive events" and as a result they are more likely to pay attention earlier to events with salient agents causing a perceptible change.

Their performance in the story-retelling task revealed that by age 3;5 Moroccan children seemed to understand the semantic and syntactic relations expressed by the verbal patterns used by the researcher in telling the story. Such understanding is evidenced by their retelling it in a way that generally preserved the original meaning although not always the narrator's perspective on the events vis-a-vis agentivity.

Preference for P1 seemed to be situationally conditioned and points to the importance of taking context and the communicative function of language into consideration when assessing the productivity of specific linguistic forms. Clark (1981, 1987, 1988,

[13]It should be noted that most repetitions recorded from the fourth graders came from one subject who produced 33% of all repetitions.

1993) suggested that in acquiring meanings of words, children are guided by the principles of semantic transparency, productivity and conventionality. Although some linguistic word formation devices may be transparent and productive in the system, conventional use may curtail their use in forming new words. In Arabic, the reciprocal pattern is semantically transparent but conventionally not utilized productively by adult speakers as many reciprocal functions are expressed with analytical phrases including P1 and a pronominal form "each other". To assess the extent of the conventional principle, an analysis of variance was conducted. Results indicate a main effect of age (F (df=3) = 3.43, $p<.02$) which suggests that with age, children tend to rely on more than one means to express the same semantic notions. Older children in particular, more often exploited the use of the P1 option to express several complex meanings such as causatives and reciprocals. In fact, well over one quarter of the appropriate responses for causatives were in the P1 substitution responses. This trend, however, did not reach statistical significance (F (df=2) = 2.31, $p<.10$).

The earlier acquisition of causative patterns compared to the other patterns tested supports Piaget's (1962) sequence of conceptual development that causation is one of the earlier relational concepts to be mastered by children. MA speaking children's overextension of the causative pattern parallels the phenomenon of late errors in the use of English causative verbs discussed by Bowerman (1979, 1982), Clark and Clark (1977) and (Slobin 1985a). In the story retelling, the three-year-olds analyzed the causative pattern and overextended its use to other contexts where adults would use a basic pattern with a reflexive pronoun, using incorrect forms such as *hadi *ka-t-WeKKeL* (P2) *buħdha* "she is feeding by herself" instead of the adult form: *ka-taKuL* (P1) *buħdha* "she is eating by herself". The use of causative patterns also tended to replace middle voice (P5) forms used in the adult story. For example, some children used *HeRReS* (P2) "he broke", instead of *t-HeRReS* (P5) "it broke", *KeFFeĦ* (P2) "he spilled" instead of *tKeFFeĦ* (P7) "it got spilled". Interestingly, and in further support of Slobin's view on the saliency of agentive events, some agentless events were simply ignored by the children and not recounted as part

of the story retelling.[14] Another factor that could have affected children's choices may have been the use of pictures in the elicitation tasks. The presence of animate agents in some of the pictures may have drawn children's attention to the agents and led them to use more causative patterns even when they were asked by the researcher to focus on the result of an activity. Although children may have productive knowledge of certain linguistic forms, at any given stage of development they may opt not to use forms because they add no communicative value in that particular setting. As Budwig put it "… children exploit particular devices to mark various kinds of perspectives that can be taken on a given scene" (1995:10).

The development of the reciprocal pattern supports Clark's conventionality principle as kicking in at a later age to curb productivity of certain derivations. Summarize Clark's principles here. While reciprocal patterns derivation steadily increased between the ages 3;6 to 7;9, it dropped from 65% among the 7 year olds to 57% among the 9-year-olds. Such progression supports a U shaped curve of development. The productive use of verbal derivational processes led to overgeneralizations explaining children's ability to produce novel verb forms. Some of the targeted verbal patterns were novel forms not normally derived by adults. The older children were beginning to conform to adults' conventional usage where reciprocals are not very frequent and the notion of reciprocity is sometimes expressed by the multifunctional basic pattern (P1). For example, older children responded with (P1) *ka-y-ɣes-l-u* "they are washing" rather than the novel form (P6) *kay-y-tɣa:SL-u* "they are washing each other" when describing a picture eliciting reciprocals where two children are washing each other.

The development of reciprocals also conforms to the order of acquisition of Hebrew patterns proposed by Berman (1980, 1985). Its later acquisition can be explained by the complex semantic relations of simultaneity which it expresses, as the child has to coordinate two perspectives at the same time, namely that the action is performed by two agents which are at the same time affected by, and affecting the action expressed in the reciprocal pattern. This finding is also in line

[14]Slobin (1985) referred to this prototypical event as Manipulative activity scene.

with the reports in the literature about later acquisition of conjunctions expressing simultaneity (Clancy et al. 1976, Clancy 1985, Aksu-Koc & Von Stutterheim 1994). The later emergence of the medio-passive, on the other hand, contradicts the generally observed developmental sequence that children as young as 2:6, learning other languages, begin to talk about agentless events (Slobin 1968, Maratsos & Abramovitch 1975, Savasir & Gee 1982, De Villiers & De Villiers 1985). This unexpected low percentage of medio-passive patterns use may be attributed to pragmatic rather than developmental factors. It may be that for these young children, the use of medio-passive is associated with situations when they want to disclaim personal involvement or responsibility for a particular act.[15] In the experimental situation, however, the actions described by the researcher did not involve the children directly and were about agents which were pictured in the input situation. In fact, the presence of the doer of the action in the pictures is likely to have resulted in a testing situation bias that influenced the results. The pictures used to represent verb pattern contrasts included the agent and the researcher's description contained an active sentence with either a P2 or P1 pattern (generally with a causative meaning) before the child was asked to switch focus to the result in order to describe what has happened to the patient. Many 3 to 4 year olds responded by simply repeating the input sentence as if they were unable to switch focus away from the prototypically transitive event of action-agent-patient (Slobin 1981, 1985a). This strong effect of pictures, prompting children to describe transitive rather than intransitive events was evident in data from both tasks.

Acquisition data[16] from typologically diverse languages such as Hebrew, Hungarian, Polish, Turkish, and Kaluli all support children's early marking of transitivity. In Slobin's terms: "In Basic Child Grammar, the first Scenes to receive grammatical markings are "prototypical", in that they regularly occur as part of frequent and salient activities and perceptions, and thereby become the organizing points for later elaboration of the use of functors" (1985:1175). How transitivity is expressed by the child will of course depend on the

[15]In Moroccan adult speech the medio passive is frequent in conversations. It allows the speaker to disclaim responsibility in reporting events without having to commit to knowing who has done it.
[16]See Slobin (1985b) for reports of acquisition of these and other languages.

formal means available in the input language. How productive and transparent the specific linguistic devices used in adult language to express transitivity will determine its appearance and acquisition. For example Semitic acquiring children will have to realize that "verb morphology [has to] be enlisted in order to describe a situation as an intransitive event rather than a transitive action". (Berman 1993:645) The English or French child, on the other hand, needs to see that transitivity is marked syntactically.

7.1 *Errors as evidence of productivity of the derivational system*

Misformed patterns derived from defective roots provide evidence of children's productive use of derivational patterns. These types of errors were particularly predominant in responses obtained from the younger children. Misformed patterns were derived from two weak (defective) but frequent verb forms from the roots *W-K-L* (P1 imperf. *ya- KuL*) "he eats" and *B-W-S* (P1 imperf. y- *BuS*) "he kisses". In both forms the underlying glide does not surface in the basic perfective and imperfective patterns but is required surfaces in the causative and reciprocal patterns. Younger children produced reciprocal forms without the required glide such as **ka-y-tKa:Lu*[17] instead of ka-y-*tWa:KLu* "they are giving each other to eat" or **ka-y-tBa:Su* instead of *ka-y-tBa:WSu* "they are kissing each other". Such errors suggest that although young children are still unable to supply the glide missing in the basic pattern for defective roots, the production of these erroneous roots is evidence that word stems are analyzed rather than rote learned. The reciprocal pattern tCa:CCu is combined with root consonants extracted from the basic pattern with a missing consonant.

7.2 *The root in the adult mental lexicon*

The psychological reality of the root in the mental lexicon of Arabic and Hebrew speakers has been subject to heated debate in the recent literature on Semitic morphology. The traditional approach considers that the consonantal root is an underlying morphological and semantic unit which has psychological reality for Arabic and Hebrew speakers. Recently, however, an alternative approach, the word based

[17]This form corresponds to an existing form with a passive meaning: "They are being eaten." It is unlikely, however, that the child meant to use the passive here.

derivation approach, opposing the root construct to various degrees has been defended by others such as Arad (2001), Bat El (2001), Benmamoun (1999), Larcher (1995), and Ratcliffe (1997), among others. According to this view, morphological rules that operate on non derived nouns are sufficient to also operate on derived words. As a result and for the sake of theoretical simplicity there is no need to postulate the additional level of the root.[18] The root based approach to Semitic morphology has been argued for in Modern linguistics by McCarthy starting with his seminal paper in 1981and defended by him and others. Empirical evidence from different sources provides support for the root as a real construct in the mental lexicon of both Arabic and Hebrew. Such evidence comes from studies of slips of the tongue (Abd-El-Jawad & Abu-Salim 1987, Berg & Abd-El-Jawad 1996), aphasic errors (Prunet et.al. 2000), Arabic hypocoristics (Davis & Zawaydeh 2001, Frisch & Zawaydeh 2001), language evolution, as well as child language (Badry 1982, 2004; Berman 1985, 1999).

7.3 *Slips of the tongue*

Abd-El-Jawad and Abu-Salim (1987) examined slips of the tongue made by Jordanian Arabic speakers and found that errors of metathesis were much more frequent than other types of errors reported in studies of slips of the tongue in other languages. They also found that vowel errors were rare in the Arabic data. According to the authors, "[t]he root morpheme is represented on an autosegmental tier and the vocalic pattern on another tier. The two tiers are then mapped onto a third tier called the prosodic template or the CV tier, which consists primarily of C's and V's and which refers to the canonical syllable pattern of the utterance" (see also McCarthy (1981) for this approach to Arabic Morphology). In a similar study which compared adult speech errors by German, English, and Arabic speakers, Berg and Abd-El-Jawad (1996) found that German and English speakers had more slips of the tongue than their Arabic counterparts that were between word slips.

[18]This is an oversimplified statement of this position. The fascinating debate for or against the root in theoretical linguistics is very complex and beyond the scope of this study which is focused on interpreting empirical evidence to understand how Arabic speakers organize their mental lexicon and use derivation in word formation

The Arabic data also supported the earlier finding that within word slips were much more frequent than between word slips. They concluded that "interacting consonants in Arabic stay closer together than interacting consonants in German (and English)".

7.4 *Aphasics' errors*

In a study of errors of an aphasic Arabic/French bilingual, Prunet, Beland & Idrissi (2000) found that their subject had frequent metathesis in all four Arabic tasks in the study (reading aloud 32.8%; repetition 31.9%; writing to dictation 14.3%; and picture naming 21%). However, in the French corpora, a very small percentage of errors were metathesis errors. The authors further observed that in Arabic only consonantal roots in verbal, nominal and adjectival forms were reversed. Vocalic patterns and consonantal affixes were unchanged. In another aphasic case, a Hebrew speaking aphasic's metathesis was pattern centered (Barkai 1980 reported in Prunet et al. 2000). Prunet et al. dismissed phonological and semantic motivations as possible explanations for these errors and argued that the preponderance of metathesis in Arabic over French in their subject (a proportion of 25 to 1) is due to a different morphological representation of the two mental lexicons. The presence of metathesis at the level of the consonantal root in Arabic and its presence at the level of the pattern in Hebrew, lends support to the notion that the Semitic mental lexicon is organized along separate tiers.

7.5 *Arabic hypocoristics*

Davis and Zawaydeh (2001) present evidence from hypocoristics to support the reality of the triconsonantal root in Arab speakers' mental lexicons. Their analysis revealed that only consonantal roots appear in hypocoristics, which have the template C1aC2 C2 uuC3, regardless of the form of the input name. For example, both *Muhammed* and *Ha:med* have the hypocoristic form *hammu:d*; and *ʔbtisa:m* and *Basma* have *Bassu:m*. The authors considered several explanations but concluded "that hypocoristic formation in Arabic crucially references the consonantal root, distinguishing root consonants from affixal and epenthetic consonants…" (For a different view and discussion of the role of the root in derivation, see Bat-El 2001, Bentin & Frost 2001, and Ratcliffe 2002).

7.6 *Language change*

The phenomenon of 'Semiticization' of borrowed words which undergo root extraction and casting into existing lexical patterns also points to the centrality of the root in underlying representations of the Semitic lexicon. For example, Moroccan Arabic incorporates French words by identifying the 3 or 4 consonants to be used as a root and then each word undergoes normal Arabic derivation processes (see appendix 3). The same process is adopted by other Arabic speakers as the examples (see appendix 4) from the Palestinian dialect, where the contact language is English, show.

8. **Conclusion**

In summary, the developmental sequence of the verbal patterns in Arabic speaking children shows that 3;5 year olds are already able to derive the causative patterns P2 and have began to derive reciprocal patterns followed by the medio-passive pattern. Such sequence of development is in line with the order of acquisition of these notions in children acquiring other languages. It lends further support to the notion that conceptual development is a pacesetter to linguistic development. In addition to universal predispositions, children also use a specific path to derive new word in Arabic. The pervasiveness of root-based derivations in the Arabic lexicon draws their attention to such processes and leads them to rely on root/pattern alternations in their production of novel words to fill lexical gaps. Their errors with defective roots reveal incomplete mastery but productivity of the system. The choice of other roots rather than the input root in cases where older children responded with the targeted pattern but used another root, which was semantically and pragmatically correct for that situation, suggests that older children have two paths leading them to coining new words. They use both vertical as well as horizontal derivations in novel word formation. When the root is regular (3 strong consonants) and the alternations with the vocalic patterns are transparent, it serves as a base for a vertical derivation. When the root is irregular (root containing a glide or glottal stop) a surface pattern serves as a base for a horizontal derivation but the reality of the root construct leads older children and adults to supply a third consonant to fill the gap in the surface form. The reliance on both word based and root based derivation is further supported by data from adult errors. In

addition, derived specialized patterns were the preferred choices in word formation, although some children made use of other options besides the use of the synthetic patterns to express the semantic notions of causation, reciprocity, and eventivity. The preference for derivation in word formation at all ages tested, and, in particular, the fact that even the younger children were able to produce patterns which are considered formally complex lends further support to the argument that criteria for measuring formal complexity are language specific and depend on typologically useful strategies. So, while interruption of the phonological elements of a stem may be difficult because such interruptions are infrequent in the input received by a child learning English, this same process is the norm in the Arabic input. Both children and adult speakers of Arabic operate with typological biases that enable them to use the root and pattern combinations in word formation. The errors with defective roots revealed incomplete mastery but productivity of derivational processes in the Arabic lexicon. Slips of the tongues, hypocoristics, aphasics' errors, and assimilation of borrowed words all support the need to postulate a root tier in the mental representation of the Arabic lexicon. Children's discovery of the root is gradual and goes through several stages. Both horizontal and vertical derivations are at work in Semitic word formation. Errors produced by both adults and children reveal that the root is a real mental construct and that the road to lexical derivation is a multi-path one.

Appendix 1

Story

Faq karim fəṣṣbaħ u mšæ ʕənd mama-h. ɣeslæt-lu wež-hu, ʕuwwəmæt-u lebbsæ t-lu ħwayž-u. æmma nabilæ ɣir fiyyeqæt-hæ mama-hæ u hiyæ tədxəl lel-ħemmæ m, u həkkæt snæn-hæ u ʕæmet fəlbanyo, u mən beʕd mešṭaṭ šʕer-hæ ərras-hæ u lebsæt ħwayž-hæ. melli kemmlæt duxlæt l-bit lmæklæ u lqæt mama-hæ kat-wekkel karim u tšerrb-u lʕaṣir u hiyæ tgul lmama-hæ: ana kbert u kaneʕref nakul u nešreb ərrasi. ma kanəħtæž ħedd iʕəwwem-ni wa-la illebs-li ħwayž-i. smeʕ-hæ karim u huwæ ihezz lkæs baš išreb buħdu sæʕæ ṭiyyəħ-u. therres lkas u tkeffeħ lʕ æṣṣir. təxleʕ karim u ṭleb mən mamah tsamħ-u. gælet-lu had nnubæ llah isa:meħ wa lakin ma tʕæwedš. melli kemml-u ləfṭur, tʕa:nq-u ləwlidat u tbaws-u mʕæ mama-hum. tšæ:ddu men iddiyat-hum u ddæ-hum baba-hum ləl mədrasa.

When Karim woke up in the morning, he went to his mom. She washed his face, bathed him, and dressed him. As to Nabila, as soon as mom woke her up, she went into the bathroom, brushed her teeth, bathed, then combed her hair by herself and put on her clothes. When she finished, she entered the dining room and found her mom feeding karim and making him drink juice. She said to her mom: I have grown up now and I know how to eat and drink by myself. I don't need anyone to bathe me or dress me. When Karim heard that he picked up the glass to drink by himself but he dropped it. It broke and the juice got spilled. Karim was afraid and asked his mom to forgive him. She told him that she forgave him this time but that he should not do it again. When they finished breakfast, the little kids, hugged each other and kissed their mom. They held each other's hand and their dad took them to school.

Appendix 2

Verbal Patterns task forms

Root	Input Pattern	Target Pattern	Picture used
NʕS	NʕeS (P1)	NeʕʕSat (P2)	Mother putting girl to sleep
LBS	LBeS (P1)	LeBbSat (P2)	Mother dressing girl
ʕWM	ʕa:M (P1)	ʕeWweMat (P2)	Mother bathing girl
QRʔ	QRa (P1)	QeRrat (P2)	Mother teaching boy
MŠT	MŠeṮ (P1)	MeŠšeṮat (P2)	Mother combing boy's hair
ṬLʕ	ṬLeʕ (P1)	ṬeLlʕat (P2)	Mother taking girl upstairs
FZG	FZeG (P1)	FeZzGat (P2)	Girl wetting boy
XWF	XaF (P1)	XeWweF (P2)	Dog frightening girl
ṬYⱧ	ṬaⱧ (P1)	ṬiYyeⱧat (P2)	Girl dropping glass
ṬYB	ṬaB (P1)	ṬiYyeBat (P2)	Mother cooking food
RŠŠ	ReŠŠ (P1)	tRa:Ššu (P6)	2 boys spraying each other
NTF	NTeF (P1)	tNa:Tfu (P6)	2 girls pulling each other's hair
ʕNQ	ʕeNneQ (P1)	tʕa:NQu (P6)	2 children hugging each other
ĐRB	ḌReB (P1)	tḌa:RBu (P6)	2 boys hitting each other
ɣSL	ɣSeL (P1)	tɣa:Slu (P6)	2 girls washing each other
XBṮ	XBeṮ (P1)	tXa:BṮu (P6)	2 cars colliding
ŠDD	ŠeDD (P1)	tŠa:DDu (P6)	2 boys holding each other
BWS	BuS (P1)	tBa:WSu (P6)	2 girls kissing each other
ʔKL	WeKkeL (P2)	tWa:KLu (P6)	2 boys feeding each other
SLM	SeLleM (P2)	tSa:LMu (P6)	2 girls greeting each other
ĐRB	ḌreB (P1)	tḌeRBat (P7)	A car hit
RMY	RMa (P1)	teRMat (P7)	A ball thrown
QṬʕ	QṬeʕ (P1)	tQeṬtʕat (P7)	A ribbon cut
ŠRB	ŠReB (P1)	TeŠReB (P7)	Drunk juice (empty glass)
ⱧLL	ⱧeLL (P1)	tⱧeLL (P7)	An opened window
ŽRR	ŽeRR (P1)	tŽeRR (P7)	A boy being pulled
XLʕ	XLeʕ (P1)	tXLeʕ (P7)	A scared girl
XZN	XZeN (P1)	TeXZeN (P7)	A hidden boy
KFⱧ	KeFfeⱧ (P1)	TKeFfeⱧ (P7)	Spilled juice

Appendix 3

Assimilated Words from French into MA

French Loans	P2	P7	Participial	Diminutive	Root
Douche (shower)	DeWweŠ	tDeWweŠ	mDeWweŠ	teDWIŠa	
	gave a shower	got showered	showered	little shower	DWŠ
Place (place)	P1				
	BlaṢa	teBLaṢa	mBLaṢi:	BliYeṢa	BLṢ
	Park	got parked	parked	small place	

Appendix 4

Assimilated words from English into Palestinian Arabic

English loans	P1	P7	Participial	Root
Nervous	NeRFeZ	tNeRFi:Z	mNeRFi:Z	NRFZ
	get angry	became angry	is angry	
Insure	ʔaNŠaR	tʔaNŠar	mʔaNŠi:R	ʔNŠR
	insure	become insured	insured	
Save	P2			
	SeYyeF	-------	mSeYyeF	SYF
	save (files)		Saved	

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