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Current Issues in Linguistic Theory (CILT) is a theory-oriented series which welcomes contributions from scholars who have significant proposals to make towards the advancement of our understanding of language, its structure, functioning and development. CILT has been established in order to provide a forum for the presentation and discussion of linguistic opinions of scholars who do not necessarily accept the prevailing mode of thought in linguistic science. It offers an outlet for meaningful contributions to the current linguistic debate, and furnishes the diversity of opinion which a healthy discipline must have.

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Volume 317

Ellen Broselow and Hamid Ouali (eds.)

Perspectives on Arabic Linguistics.
Papers from the annual symposia on Arabic Linguistics. Volume XXII–XXIII:
College Park, Maryland, 2008 and Milwaukee, Wisconsin, 2009

PERSPECTIVES ON
ARABIC LINGUISTICS

PAPERS FROM THE ANNUAL SYMPOSIA
ON ARABIC LINGUISTICS

VOLUME XXII–XXIII:
COLLEGE PARK, MARYLAND, 2008
AND MILWAUKEE, WISCONSIN, 2009

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Acknowledgements

Since its inception, the Arabic Linguistics Society has assembled a selection of papers from each of its annual meetings in a volume entitled *Perspectives on Arabic Linguistics*, published in the *Current Issues in Linguistic Theory* (CILT) series. The present volume continues this tradition, with the exception that it includes papers from two previous annual meetings. The selection of the papers was rigorous, with only thirteen papers of the twenty seven presented accepted for inclusion in this combined volume. We would like to thank all who served as reviewers for these papers.

Some the papers included in this volume were presented at the 22nd Arabic Linguistics Symposium (ALS), which was held at the University of Maryland, College Park on March 8-9, 2008. The other papers were presented at the 23rd ALS, held at the University of Wisconsin-Milwaukee (UWM) on April 3-5, 2009. We gratefully acknowledge the funds provided by the College of Letters and Science and the Center for International Education at UWM to organize the Milwaukee conference. We would also like to thank Zafer Al-Labibidi and Travis Major for their help in the process of preparing this volume.

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Ellen Broselow & Hamid Ouali
Stony Brook & Milwaukee
April 2011

Editors' Introduction

Arabic linguistics has a long and rich tradition originating in the work of the medieval Arab grammarians. This tradition has been the subject of insightful, in-depth analysis in the work of scholars such as Versteegh (1997, 2001) and Bohas, Guillaume & Kouloughli (1990). More recently, the monumental *Encyclopedia of Arabic Language and Linguistics* (Versteegh et al. 2009) provides a comprehensive overview of the history and structure of many of the varieties of Arabic, as well as a review of the major findings of research in Arabic linguistics. The goal of this introduction is not to recapitulate the overviews provided in these works, but rather to highlight the contributions of this volume to the field of Arabic linguistics as well as to the wider field of linguistics. We begin with a discussion of the ways in which research in Arabic linguistics has contributed to research on language in general.

1. Linguistics and Arabic linguistics

Modern research in Arabic linguistics has taken place within the context of a linguistic theory that has as its goal the understanding of language as a human phenomenon, from which it follows that all languages are considered to be based on similar principles. Thus, while Arabic linguistics maintains its focus on Arabic, it makes contributions to the field as a whole, since other languages display structures and processes similar to those found in Arabic. In the following section we discuss the ways in which Arabic linguistics has contributed to recent research in linguistics in several different areas: the development of theories of language universals and typology; the connection between typology, language acquisition, and language change; the interface between grammatical modules; and the increased reliance on experimental and corpus data. In Section 2 we discuss the ways in which these issues are reflected in research in the Arabic linguistics tradition and specifically in the papers in this volume.

1.1 Universals and cross-language variation

One goal of linguistic research of the past decades has been to determine whether all human languages share specific properties, and to define the ways in which languages can differ. This question is far from settled; a recent issue of

Behavioral and Brain Sciences devoted to the topic of linguistic universals presents viewpoints ranging from the claim that “Languages differ so fundamentally from one another at every level of description (sound, grammar, lexicon, meaning) that it is very hard to find any single structural property they share” (Evans & Levinson 2009: 429) to replies arguing that even languages that appear different on the surface may exhibit striking similarities at more abstract structural levels (e.g. Baker 2009).

Detailed investigation of a variety of languages, both within and across language families, is obviously crucial to developing and testing theories of linguistic universals and typology. Research on Arabic has had increasing impact on such theories. For example, in phonology, patterns found in Arabic dialects have been influential in the development of theories of word stress; Hayes' (1995) volume on metrical structure, for example, includes data from eleven varieties of Arabic. In syntax, Classical Arabic has attracted attention as a verb-initial language, and much work has focused on the implications of Arabic data for theories of syntactic typology (Fassi Fehri 1982, 1988, 1993; Mohammad 1990, 1999; Benmamoun 1990, 1992, 2000; Eid 1991; Shlonsky 1997, and Brustad 2000, to cite just a few). In theories of word structure, Arabic data have been of particular interest, as Semitic languages have often been described as presenting a relatively exotic morphological system, in which discontinuous consonantal roots are interleaved with vocalic patterns or templates. Much research has been devoted to investigating whether Semitic morphology is truly different in kind from more familiar concatenative morphology, with some researchers questioning the psychological reality of consonantal roots (e.g. papers in Shimron 2003; Farwaneh 2007), or arguing that Arabic morphology is fundamentally word-based, with templatic effects arising from stringent restrictions on maximal word size that force stem vowels to be replaced by affixal vowels (Ussishkin 2003). Even in an analysis assuming roots and templates as morphological primitives, McCarthy (1981) argued that the principles used to associate roots with templates parallel those operating in other languages to associate tonal melodies with segments. An additional strand of research has focused on the role of roots and templates in the processing of Arabic words (Boudelaa & Marslen-Wilson 2000, 2001, 2004, 2005). The various analyses of Arabic morphology illustrate the ways in which Arabic data have been used to test and refine hypotheses concerning the limits of structural differences across languages.

Within Arabic linguistics, interest in cross-language variation has increased in recent years. Whereas earlier work tended to focus mainly on Standard Arabic, much of the recent work on Arabic has been comparative in nature (e.g. Brustad 2000; Benmamoun 2000; Aoun, Benmamoun & Choueiri 2010 in

syntax; Farwaneh 1995 and Watson 2002 in phonology). Many of the papers in this volume fall within this tradition of investigating the fit between specific hypotheses concerning the limits of variation across human languages and the data of one or more varieties of Arabic.

1.2 Sources of typological tendencies: Language acquisition and language change

The claim that there exists a preponderance of structural similarities across even historically unrelated languages leads inexorably to the search for an explanation of why particular structural patterns should be preferred. Hypotheses about why some structural features are rare and others virtually ubiquitous are crucially tied to theories of language acquisition and language change, and approaches to this question span a continuum. At one end are innatists who argue that language acquisition is shaped by universal linguistic principles which limit the space of possible grammars assumed by language learners; in this camp are approaches assuming a universal set of parameters (e.g. Chomsky & Lasnik 1993) or, in some work in Optimality Theory, a universal set of constraints (e.g. Prince & Smolensky 1993). At the other end of the continuum are accounts that attribute cross-linguistic tendencies to the fact that as language is transmitted across generations, certain structures are more susceptible to misperception or misinterpretation (e.g. Blevins 2004; Croft 2000), or that general properties of learning or memory make certain structures more likely to be mastered (e.g. Givón 1984; 1992). In the Arabic tradition, we also find a range of approaches, including work that proposes analyses of Arabic grounded in a set of putative universal, innate principles (Fassi Fehri 1982, 1988, 1993; Mohammad 1990, 1999; Benmamoun 1990, 1992, 2000; Eid 1991; Shlonsky 1997, to cite just a few) and work taking a functionalist perspective (e.g. Brustad 2000). Researchers have used data from both first and second language acquisition to test hypotheses concerning the role of innate principles and general cognitive factors in language acquisition. For example, the fact that children learning Egyptian Arabic fail to master the formation of the plural until relatively late (as opposed to learners of other languages) was cited by Slobin (1973) as an example of the role of inherent structural complexity in determining the course of language acquisition. The acquisition-oriented papers in this volume contribute to this ongoing discussion.

1.3 Interfaces of linguistic subsystems

Along with the development of linguistic descriptions of increasing scope and complexity has come the realization that languages function as integrated systems

rather than as discrete modules of phonology, morphology, syntax, and semantics. Recent years have seen a burgeoning interest in the interfaces between different components of grammar, and in the development of formal models to describe these interactions (e.g. Truckenbrodt 2007). Arabic data are beginning to have increasing influence in the development of these models. For example, we can see increasing attention to Arabic intonation, an area at the juncture between phonetics, phonology, syntax, and discourse. While Ladd's (1996) overview of intonation and sentence stress contains the caveat that "The sample of languages considered in this chapter and the next is unquestionably Eurocentric [...] rather little is known about intonation in languages in other parts of the world" (Ladd 1996: 118), the 2008 edition cites Egyptian Arabic (following Hellmuth 2007) as an exemplar of a language in which each content word tends to be accented. Several papers in the current volume reflect this increasing interest in the interface of syntax, semantics, phonology, and pragmatics.

1.4 Linguistic data

While early linguistic research in the philological tradition defined the object of study as the language itself, much linguistic research in the twentieth century has defined linguistics as a cognitive science, with the goal of understanding the speaker's internalized grammatical system of which the language is a reflection. This move has led to increased use of experimental techniques to test hypotheses concerning the nature of speakers' internalized grammars, such as artificial language learning experiments designed to determine whether typologically common structural patterns are more easily learned than rare or unattested patterns (e.g. Moreton 2008). Furthermore, theoretical linguists have come to recognize the degree of variation typically found within languages and even within speakers, which has led to greater reliance on corpus studies, as opposed to elicitation of judgments from one or two native speakers. Whereas in early generative accounts, intra-speaker variation was often seen as resulting from performance errors or from co-existent dialects, formal models now frequently incorporate gradience into the grammar (e.g. Boersma & Hayes 2001); these models are probabilistic, predicting that individual speakers may produce variable outputs. Here too Arabic data have played a significant role in shaping theory, as one of the earliest arguments for incorporating gradience into grammatical models came from Arabic, specifically the well-known tendency for the consonants in an Arabic root to be distinct in their place of articulation. Frisch, Pierrehumbert & Broe (2004) argued that this restriction represents a statistical tendency rather than a categorical requirement, and demonstrated that the strength of the restriction varies according to the overall similarity and proximity of the consonants. Thus, Arabic data

have been influential in causing many researchers to incorporate statistical regularities into models of language.

2. Current trends in Arabic linguistics

Arabic has always been of interest to linguists for two reasons: Arabic phonology, morphology, and syntax present various structural features that are relatively unusual, and most Arabic-speaking communities are diglossic, with some distance between the written and spoken varieties, raising interesting questions for psycholinguistic and sociolinguistic research. Recent years have seen an increasing body of research in Arabic linguistics that focuses not only on formal analyses of Arabic grammatical structure but also spans the fields of neurolinguistics, psycholinguistics, sociolinguistics, experimental phonetics, and computational linguistics, with research methodologies including behavioral studies of normal and disordered performance, neuroimaging, and modeling. The papers in this volume reflect these various perspectives and emphases.

The present volume consists of three sections, the first section devoted to phonetics and phonology, the second to syntax, and the third to language acquisition and language contact. We will discuss the papers in the context of research within their subfields in Arabic linguistics as well as the context of the broad trends in general linguistics.

2.1 Phonetics and phonology

Arabic phonology presents a number of features that have stimulated considerable study in the field of Arabic linguistics. Arabic's consonant inventory includes a large number of gutturals, which have raised interesting issues for the theory of distinctive features (McCarthy 1991). Arabic systems also contain a relatively rare contrast (pharyngealization, or emphasis), and emphatic consonants typically spread their features, with the targets, triggers, direction, and domain of emphasis harmony differing across different varieties (see, e.g. Watson 1999). Arabic varieties also display a rich inventory of syllable types; for example, the North African dialects have long been recognized as different in their syllable structure from most other varieties, with consonants appearing to serve as syllable nuclei – a structure that is typologically rare. This pattern has been a topic of continuing interest; for example, Shaw, Gafos, Hoole & Zeroual (2009) employed Magnetic Articulometry techniques to investigate articulatory timing patterns in Moroccan Arabic, shedding light on the ways in which this language organizes its phonological structure. As mentioned earlier, stress in Arabic dialects has also been well

studied, and cross-dialectal variation has been a fruitful source of data for models of the typology of metrical structure.

It is safe to say that most if not all recent work on the phonetics and phonology of Arabic has addressed the question of where Arabic fits into larger theories of cross-language variation. All four papers in this section situate the phenomena they describe within the context of theories of language typology and linguistic universals. The range of phenomena discussed is broad, from the realization of voicing through sentence-level intonation. Three papers deal with production while the fourth focuses on parsing.

Two papers, by Kabrah and by Abu-Mansour, provide formal analyses in the tradition of theoretical phonology. Both papers assume the framework of Optimality Theory, in which a grammar is assumed to consist of a universal set of constraints which together define the optimal realization of a lexical representation. Constraints are of two types: structural constraints, which penalize cross-linguistically marked structures such as word-final voiced obstruents, and faithfulness constraints, which penalize the loss of lexically marked features (such as voicing). These constraints may conflict, in which case the ranking of the constraints is crucial: in languages such as German and Russian, the structural constraint penalizing final voiced obstruents outranks the constraint that requires voicing contrasts to be maintained, while in English faithfulness constraints outrank this structural constraint. The link to typology in this framework is clear: the set of structural constraints is part of the grammar of every language, but a constraint may be rendered inactive by its ranking below antithetical constraints. In this framework, typology and acquisition are closely linked (Gordon 2007) – because the constraint set is universal, grammars differ only in the ranking of their constraints, and the task of the language learner is to master the constraint rankings appropriate to her language. The set of possible phonological grammars is predicted to equal the set of all possible constraint rankings.

Restrictions on the position of voicing contrasts have served as the focus of a number of studies in the Optimality Theory framework. Lombardi (1999) proposed that the patterns found in attested languages could be described in terms of a small set of constraints whose rankings varied across languages. These constraints include one requiring adjacent obstruents to agree in voicing, ruling out clusters such as /kz/ and /gs/, and one requiring that obstruents in onset position maintain their voicing. Kabrah (this volume) finds evidence from both elicited data and corpus data that in Cairene Arabic, both constraints are active, causing the realization of underlying /kz/ and /gs/ as [gz] and [ks], respectively. Thus, the fact that voicing contrasts in obstruents are neutralized in pre-obstruent position but maintained elsewhere is accounted for by two constraints encoding universal tendencies. Kabrah provides a formal analysis

of the data within the context of Lombardi's theory of cross-linguistic voicing typology, providing additional support for constraints that impose more stringent faithfulness requirements on segments in particular positions in the syllable and the word. Beyond this, however, Arabic provides a new type of data: the guttural consonants, which are absent from the languages included in most previous investigations of voicing. Kabrah shows that some of the gutturals pattern with sonorants and others with obstruents, bringing new evidence to bear on the not uncontroversial classification of gutturals, and uncovers interesting differences between the patterning of gutturals in Cairene vs. in other Arabic dialects (Abu-Mansour 1996). Most interestingly, however, she shows that one guttural consonant, the voiceless pharyngeal fricative, patterns in some contexts with obstruents and in others with sonorants. This fact appears to require an explanation in terms of the specific articulation of this segment rather than in terms of phonological features, and suggests that the model relying solely on phonologically-defined constraints may require revision. This example points up the importance of Arabic data in testing theories of typological variation.

Abu-Mansour's paper reflects the new interest in interfaces between linguistic modules. This paper focuses on phonology–syntax interactions in Arabic, specifically the role of syntactic structure in conditioning vowel deletion, and presents previously unreported data on the syncope of vowels in Makkan Arabic. Like Kabrah's paper, Abu-Mansour's presents a formal analysis of the data, employing a set of Optimality-Theoretic constraints that define a typology of possible mappings between prosodic structure (Nespor & Vogel 1986) and syntactic structure. Recent work on the phonology–syntax interface has presented evidence for a number of phonological processes conditioned by the edges of phonological phrases (e.g. Selkirk 1995; Truckenbrodt 2007) and Optimality-Theoretic analyses of these phenomena have described the phrasal structure of various languages in terms of a set of constraints demanding the right (or left) edge of a particular syntactic constituent be aligned with the right (or left) edge of a prosodic constituent. The complex patterns of syncope in Makkan appear to involve distinct processes at the word level vs. the phrase level which are triggered by distinct conditioning factors to the left vs. to the right of the targeted vowel. However, Abu-Mansour shows that it is possible to provide a unified analysis of the complex patterns of word-level and phrase-level syncope, as well as the directionality effects of righthand and lefthand contexts, by assuming a set of ranked constraints which include constraints aligning edges of phrases and syntactic maximal projections. Her paper provides further evidence that Makkan Arabic is among the languages that show phrase edge effects, and provides new evidence for a particular model of the phonology–syntax interface.

The paper by El Zarka, a study of intonation in Cairene Arabic, also focuses on interface issues, in this case the relationship between the fine phonetic details

of intonational melodies and the larger considerations of discourse. A longstanding debate in the study of intonation concerns the extent to which languages may differ in their inventory of intonational melodies. The 'universalist' view (e.g. Bolinger 1989) holds that pitch contours are related to emotion, with certain contours signaling similar messages across languages – high or rising pitch, for example, universally signaling incompleteness or interest. In contrast, the autosegmental-metrical view (e.g. Ladd 2008 [1996]) holds that while intonational melodies are structurally similar across languages, being composed of a series of tones, languages may vary in their inventory of tonal melodies, the meanings they assign to these melodies, and the ways in which the melodies are associated with segmental structures. El Zarka's paper addresses the implications of the Arabic data for theories of the typology of intonation. Based on careful phonetic investigation of Cairene sentence intonation, El Zarka comes down on the universalist side, arguing that the shape of pitch melodies is iconic, with tonal contours correlated with basic constituents of information structure. In contrast to the formal models of the Kabrah and Abu-Mansour papers, El Zarka explicitly rejects a formal approach, pointing out that autosegmental analyses describing intonational melodies in terms of strings of abstract pitch targets were developed mainly on the basis of English. We note, however that Hellmuth's (2007) dissertation, mentioned above, does propose an autosegmental analysis of Egyptian Arabic intonation, pointing up the need for further investigation of intonation in this and other Arabic dialects.

While the three preceding papers focus mainly on speech production, Aquil's paper focuses on speech processing, specifically the question of how Cairene Arabic speakers segment a continuous acoustic signal into discrete words. As Aquil points out, previous studies of processing in Arabic have focused on the role of morphological structure (Boudelaa & Marslen-Wilson 2000 through 2005); hers is the first study of the relationship between prosody and processing in Arabic. A model of the typology of word segmentation has emerged (e.g. Cutler, Demuth & McQueen 2002) in which listeners are influenced by such factors as the shape of possible words in their language and the position of stressed syllables. Using the word spotting technique, in which listeners are asked to identify actual words within longer strings, Aquil demonstrates an effect for stress as a segmentation unit, consistent with Cairene Arabic's status as a stress-timed language. She shows that while participants may consider several candidate segmentations for a single string, they consider only candidates that are consistent with the native language constraints defining possible syllables, possible feet, and minimal word size. Thus, the native language phonological grammar plays an important role in processing. While this study draws on the extensive knowledge of syllable structure and stress that has emerged from the Arabic linguistics tradition, it also points

a new direction for research in this area, as well as adding to the body of research on word segmentation in non-European languages.

2.2 Syntax and semantics

The recent trends in Arabic syntax reflect to a large extent the developments in syntactic theory. With the elimination of the different levels of representation (Chomsky's 1995), namely Deep Structure (D-Structure) and Surface Structure (S-Structure), and the proposal that syntactic derivations proceed to satisfy requirements of sound (Phonetic Form; henceforth: PF) and meaning (Logical Form; henceforth: LF), there has been an increasing body of research that tries to discover the type of conditions that hold at PF and LF interfaces respectively. The so-called Agreement asymmetry in Arabic is one of the syntactic phenomena that have received much attention, with a split in analysis among those who claim that Agreement in general takes place at PF and those who claim that it takes place at LF.

Subject–verb agreement in Standard Arabic, as is well known, is sensitive to the position of the subject with regard to the verb. The verb inflects for full subject-agreement in SVO sentences as in (1) and partial agreement, in Person and Gender, in VSO sentences as in (2).

- (1) *zan-nisa:ʔ-u ju:fa:rik.na*
The-women-NOM participate-IMP.3PF
r-riʒa:l-a fi l-muḏ'a:harat-i
the-men-ACC in the-demonstration-GEN
‘The women participate with men in the demonstration’
- (2) *tu:fa:rik.u n-nisa:ʔ-u*
participate-IMP.3SF the-women-NOM
r-riʒa:l-a fi l-muḏ'a:harat-i
the-men-ACC in the-demonstration-GEN
‘The women participate with men in the demonstration’

This agreement asymmetry has been highly debated in the literature, especially in the generative camp, and different proposals have been advanced to explain it; see Fassi Fehri (1982, 1988, 1993), Mohammad (1990, 1999), Benmamoun (1992, 2000), Eid (1991), Bahloul & Harbert (1993), Aoun, Benmamoun & Sportiche (1994), Shlonsky 1997 and recently Soltan (2007). Fassi Fehri (1982, 1988) and Mohammad (1990, 1999) argue that partial agreement in VSO sentences is the result of the verb agreeing with a preverbal null expletive, whereas full agreement results from a specifier–head agreement relation with the subject. Fassi Fehri (1993) maintains that full agreement is a result of pronoun incorporation with the verb

whereas partial agreement is not (see Benmamoun 2000 for arguments along these lines). Bahloul and Habert (1993), and Bahloul (2006) argue that full agreement results from a specifier–head agreement with the subject whereas partial agreement is obtained as a result of a government relation between the verb and the post-verbal subject (see Soltan 2007, for a similar account using a Probe-Goal analysis in Chomsky 2000, 2005).

In recent developments, the debate has moved to the interface conditions under which agreement and other syntactic phenomena obtain. Benmamoun (1996, 2000) maintains that agreement is a PF phenomenon and hence it reflects how Syntax interacts with and is constrained by Phonology requirements. In this volume Fassi Fehri takes a different stance, arguing that different forms of agreement, more specifically subject–verb agreement asymmetries, the ‘subject pronoun deficiencies’, and morpho-syntactic variation in reciprocal expressions in Standard and Classical Arabic, can be more successfully accounted for under LF conditions or what he calls ‘a fine-grained semantic syntax’. In McNabb & Kennedy (this volume) PF conditions or constraints are also used to explain the disparity between the distribution of two types of comparative adjectives in Palestinian Arabic, namely quality adjectives and quantity adjectives. McNabb & Kennedy argue that some structural violations that have been considered purely syntactic (e.g. Left Branch Conditions) are PF violations that can be remedied by PF deletion. They discuss two types of comparatives, namely quantity and quality adjectives which, they argue, have a different distribution in comparative constructions that are headed by *ma* ‘that’ in Palestinian Arabic. They show that this difference in distribution can be explained in configurational terms: The internal structure of the Determiner Phrase (henceforth: DP) prohibits the movement of quality adjectives but not of quantity adjectives. Movement of the quality adjectives within the DP in order to check agreement features (Chomsky 1995; Fassi Fehri 1999) and from the DP to Spec,CP (Ross 1967; Bresnan 1973; Chomsky 1977, among others) creates structures whose features do not correspond to lexical items in Palestinian, i.e. it incurs a PF violation. By appealing to PF deletion the offending structure is salvaged rendering that comparative structure grammatical (Kennedy & Merchant 2000).

Case is another topic that has received and is still receiving great deal of attention in Arabic syntax. Depending on its syntactic distribution and function, the noun in Standard Arabic can have three possible case forms: nominative, accusative, or genitive. The subject typically has nominative case, the object accusative case, and the complement of a preposition has genitive case as shown in (1) and (2) above. However, when the subject is preceded by the complementizer *zinna* or one of her sisters, as in (3), the subject must have accusative case, as shown by the ungrammaticality of (4):

- (3) *zinna n-nisa:l-a ju:fa:rik.na*
 Comp The-women-ACC participate-IMP.3PF
r-ri:za:l-a fi l-muð'a:harat-i
 the-men-ACC in the-demonstration-GEN
 ‘The women participate with men in the demonstration’
- (4) **zinna n-nisa:l-u ju:fa:rik.na*
 Comp The-women-NOM participate-IMP.3PF
r-ri:za:l-a fi l-muð'a:harat-i
 the-men-ACC in the-demonstration-GEN

The conditions under which case is assigned to the noun have also evolved, reflecting the evolution in syntactic theory. In the generative literature and specifically within the Government and Binding (GB) framework, Aoun (1986) and Fassi Fehri (1993) argue that case is assigned under government along the lines of what the medieval grammarians initially proposed. Within Minimalism, where government as a syntactic relation was entirely eliminated, case assignment calls for new explanations (Benmamoun 2000). Leung (this volume) argues that structural case is licensed by the mood feature that originates in the complementizer, instead of by the tense feature, and argues that the case-assigning capacity that complementizers have supports the recent analysis of Complementizer–Tense agreement relation, couched within the Probe-Goal theory in Minimalism.

Bakir (this volume) looks at another property of complementizers, namely their structural status in the clause structure. He revisits Rizzi’s (1997) so-called split-C hypothesis, claimed to be universal, according to which the CP projection is a multi-layer projection consisting of a variety of semantically relevant functional projections that encode semantic and pragmatic properties of the sentence (Rizzi 1997). There are positions in the left periphery that are specifically for certain types of extracted elements, namely: topics, focused elements, wh-elements and others. Bakir argues that data from Iraqi Arabic seem to cast doubts on some of the tenets of this hypothesis. The dislocated elements in Iraqi Arabic show great variation in terms of their syntactic distribution. Some of these elements may surface in other positions than their canonical positions in the left periphery. A’-movement, overt or non-overt, to these canonical positions cannot always be motivated, because of the existence of a second landing site or because of some scope conflict. Given these facts, he argues that the split-C hypothesis will have to abandon its universality. Its adequacy may be limited to only some languages. Less restrictive approaches to the structure of the left periphery will be more adequate in accommodating the facts in languages like Iraqi Arabic that show free order and iterability of the dislocated elements.

Unlike the aforementioned syntax papers, Chatar-Moumni's paper stands out as the only paper to offer a structuralist analysis. In her meticulous analysis of the word *kan* "be" in Moroccan Arabic (MA), she argues against the characterization of this word as a copula in the context of a nonverbal unit and as an auxiliary in the context of a verbal unit. She argues that the notion of copula, borrowed from the Indo-European languages, is not relevant for *kan* in MA but rather that the notion *connective verb* is the more accurate characterization. She shows that although *kan* is semantically weak, it is syntactically a full verb, "particularly a bivalent verb requiring two essential arguments: a subject and an attribute". Therefore, in the connective structures, *kan* is the syntactic nucleus (syntactic predicate). She also shows that even though in the context of a verbal unit *kan* exhibits some features of auxiliaryity, it is not an auxiliary inasmuch as it doesn't form a "structure of auxiliaryity".

2.3 Language acquisition and language contact

The fact that most Arabic-speaking communities are diglossic, with the written variety distinct from the colloquial, has stimulated research on the effects of diglossia and language contact on acquisition of both spoken and written Arabic. The papers in this section investigate the effects of contact between different varieties of Arabic, or between Arabic and other languages, on processing, acquisition, production, and loanword adaptation, in the areas of phonetics, phonology, morphology, and syntax. These papers illustrate the range of methodologies that have been brought to bear on the investigation of acquisition in situations where learners are exposed to multiple linguistic systems.

Following on earlier work (Saiegh-Haddad 2003, 2004, 2005, 2007) investigating the effects of diglossia on the processing of Arabic, in this volume Saiegh-Haddad examines how children's processing is affected by the phonological distance between Spoken Arabic and Standard Arabic. She argues, based on results from her previous experimental studies with Arabic-speaking children, that the phonological distance between the spoken and the standard varieties affects phonological processing skills, which consequently affect reading development. This paper illustrates the important connections between the process of acquisition and the context in which language is learned, and provides another piece to the processing puzzle investigated in Aquil's paper in this volume.

In a similar vein, Khamis-Dakwar explores the acquisition of Subject-Verb-Object (SVO) and Verb-Subject-Object (VSO) structures in Palestinian Colloquial Arabic. Her findings suggest that the VSO order is mastered early, and is preferred over SVO by the young age groups, whereas SVO order appears late, even though it is the more frequent order in the adult target language. The explanation she offers

is that children acquire head movement before acquiring phrase movement. They therefore succeed better with VSO sentences than with SVO sentences since the former involve only verb movement, while SVO sentences presumably involve NP movement. With age, having mastered both types of movement, children shift to predominantly using the more grammatically complex SVO structure, which is the preferred and more abundant structure in the dialect. These findings clearly have implications for theories of the connection between acquisition and typology.

Saadah's paper focuses on the simultaneous acquisition of two languages from the standpoint of production. She investigates the question of how bilingual children acquire the fine phonetic details of phonological contrasts in their two linguistic systems, focusing on the acoustics of obstruent voicing in the speech of Arabic/English bilinguals. Both Arabic and English employ a phonological contrast between voiceless and voiced obstruents, but use different acoustic patterns to realize this contrast. Saadah presents evidence that the bilinguals appear to have mastered the phonetic structure of each language. Furthermore, the bilingual children exhibit gender-linked differences in the realization of voicing that mirror those of monolingual adults. This study sheds light on the extent to which bilinguals are able to maintain distinct phonetic/phonological systems in their two languages. Furthermore, the investigation of the phonetics of voicing in the speech of speakers of Palestinian Arabic provides an interesting complement to Kabrah's investigation of the phonology of voicing in Cairene Arabic.

Walter's paper deals with morphology in both loanword phonology and in the acquisition of Arabic by adult second language learners. She investigates the factors that determine how foreign words are assigned to morphological categories – specifically, how words are assigned a morphological gender (in borrowings from Arabic to Romance languages and vice versa) and how words are pluralized in Arabic (as either sound plurals or broken plurals). This study bears on one of the central questions in linguistics today: to what extent speakers, when faced with new forms, rely on the statistics of their existing lexicon vs. on abstract grammatical generalizations. Through careful corpus analysis of words borrowed from Arabic into Spanish and Portuguese and from French into Moroccan Arabic, Walter reveals that borrowers assign gender to foreign words in proportions that reflect the distribution of gender membership in the pre-existing lexicon. She then reports on an experimental study of pluralization patterns used by English speakers learning Arabic which reveals a similar tendency for these adult second language learners to produce plural types with a frequency roughly corresponding to their frequency in the native lexicon. However, she shows that this pattern contrasts with the behavior of children learning Arabic as their first language, who tend to rely on a morphological default pattern, resulting in over-regularization. The contrast between the behavior of children, who tend to regularize, and adults,

who tend to rely on the patterns in their existing lexicon, is consistent with the findings (discussed above) that Arabic-learning children are unusually late in mastering the complex Arabic plural system. The paper concludes with a formal grammar of gender assignment that models the tendency to match lexical statistics by incorporating probabilistic constraint rankings, illustrating the way in which grammatical theory can be used to illuminate the patterns revealed in corpus data and in experimental acquisition data.

3. Closing remark

Owens (1990:253) argues that “Arabic grammatical theory, like any formal theory of grammar, from its origins has been concerned not only with description but also with the explanation of form”. The papers in this volume continue the tradition of seeking explanations for structural patterns. While the papers illustrate a range of approaches, from formalist to functionalist, each paper combines rigorous analysis of a set of data with explicit models of some aspect of human language.

Note on transcription of Arabic

One unfortunate aspect of the Arabic linguistics tradition is that no single system for standardizing phonetic representations has emerged. In this volume we follow the notation of the International Phonetic Alphabet (IPA) for transcription, which departs in several respects from various systems of representation that have been used in the literature. For instance, the palatal glide as in English ‘yes’ is represented as [j] (rather than [y]) and the voiceless alveopalatal fricative as in English ‘ship’ as [ʃ]. Voiceless and voiced alveopalatal affricates (as in ‘chip’ and ‘jet’) are represented as [tʃ] and [dʒ] respectively, and voiceless and voiced velar fricatives as [x] and [ɣ]. The voiceless and voiced pharyngeal fricatives are represented as [ħ] and [ʕ], respectively, and emphatic (pharyngealized) consonants are represented with a superscript [ɾ].

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PART I

Phonetics & phonology

Empirical evidence

Stress as a perceptual unit in Cairene spoken Arabic

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Continuous and overlapping sounds in connected speech yield an output that has very few reliable cues to detect word boundaries. This may obscure listeners' recognition of spoken words. Therefore, investigations to find the processes native listeners use to start lexical access have been the focus in psycholinguistic studies. Segmentation was identified as one of the processes. Research conducted on different languages identified different prosodic units employed in segmentation and the recognition of spoken words. The following paper reports on one of the first studies conducted on Arabic connected speech investigating the role stress plays in the segmentation and recognition of words in spoken Cairene Arabic. Phonologically Cairene Arabic is identified as a stress-timed language. However, few empirical studies have been conducted to validate or refute this classification. Using the 'word spotting' technique, the present study found an effect for stress as a segmentation unit, hence providing empirical evidence for the theoretical classification.

Keywords: Egyptian connected speech; word boundaries; recognition of Arabic spoken words; segmentation; prosodic cues in segmentation; stress in Cairene Arabic; stress a segmentation unit; word spotting.

1. Introduction

The speech stream is a continuous signal in which the end of one word often blends into the beginning of the next (Delattre, Liberman, & Cooper, 1955; Liberman, Cooper, & Studdert-Kennedy, 1967; Liberman, Delattre, Cooper, & Gerstman, 1954). From this acoustically blurred output (Bowen, 1977) a listener must reconstruct what words the speaker actually intends. Despite this, the subjective experience of a speaker and a listener is not that of continuity but of discreteness. Passage from continuity to discreteness has been a challenge to linguists, psychologists and

computer scientists alike. Research in psycholinguistics and spoken word recognition has identified segmentation strategies that make use of prosodic information such as stress (Cutler, 1997, 1999; Cutler & Butterfield 1992; Cutler, Dahan, & van Donselaar 1997; Frauenfelder & Floccia 1999; Grosjean 1985; Grosjean & Gee 1987; McQueen, Norris, & Cutler 1994; Tyler & Frauenfelder, 1987). Languages may differ in their segmentation strategies (Cutler 1997; Otake & Cutler 1996; Otake, Hatano, & Yoneyama, 1996); for example, English uses the foot (i.e. stress) as a unit, where French uses the syllable (Cutler, Mehler, Dennis, & Segui 1986) and Japanese the mora Cutler 1997; Cutler & Otake, 1994; Otake, Cutler, & Mehler 1993; Otake, et al. 1996).

Psycholinguistic studies conducted on the processing of Arabic have generally focused on the role of morphological structure rather than on prosodic units utilized in the segmentation and thus recognition of spoken words in connected speech (Boudelaa & Marslen-Wilson, 2000, 2001, 2003, 2004, 2005). The present paper presents a psycholinguistic study of word segmentation by speakers of Cairene Arabic (henceforth referred to as CA) investigating the role of prosodic structure in the segmentation of connected CA spoken language.

Section 2 of this paper gives an overview of the interaction between syllable structure and stress in Cairene Arabic. Section 3 reports on an empirical study employing word spotting to study the role of prosodic structure in the segmentation of CA connected speech.

2. Overview of syllable structure and stress in CA

In this section I describe syllable structure and stress placement in CA.

2.1 Syllable structure in CA

CA has five syllable types: CV, CVC, CVV, and superheavy CVCC and CVVC. A syllable must contain an obligatory onset consisting of exactly one consonant. For example, in the borrowed word *'America'* a glottal stop is inserted [ʔam.ri.ka] to provide an onset for the initial syllable.

Superheavy CVCC and CVVC syllables are restricted to word or phrase-final position. Unlike English where the domain of syllabification is the phonological word (Nespor & Vogel, 1986), the domain of syllabification in CA is the utterance. When a sequence of three consonants arises within a word through suffixation or within a phrase by concatenation of words, a vowel is inserted to break up the cluster.

- (1) a. kalb 'dog'
kalbína 'our dog' / kalb-na/
dog-our
b. katáb-t 'you wrote'
katábtí gawáab 'you wrote a letter' / katab-t/
wrote-2 m. sg.

The final consonant of the original cluster (e.g. [b] in *kalb*, [t] in *katabt*) syllabifies as an onset to the following epenthetic vowel.

Superheavy CVVC syllables are also restricted to word-final and or phrase-final position. When a CVVC syllable becomes word-internal or phrase-internal as a result of suffixation or word concatenation, the long vowel of the CVVC is shortened. The following example illustrates the vowel shortening CVVC syllables undergo in word medial position when suffixation occurs.

- (2) a. kitáab 'book'
b. kitáb-na 'our book'

See (Broselow, Huffman, Chen, & Hsieh, 1995), for a detailed analysis of the durational patterns of Egyptian speakers illustrating the neutralization in the contrast between phonemically long and phonemically short vowels by shortening the long vowels in closed syllables. In their experiment they found the lexically long vowel CVVC was quite shortened in closed syllables and was even shorter than the lexically short vowel in an open syllable CV. Additionally, if the coda consonant cluster of a CVCC happens to be a geminate (doubled) consonant, native speakers of Cairene Arabic pronounce it as a single consonant.

- (3) a. ʃarr →[ʃar] 'evil'
b. bonn →[bon] 'coffee beans'

2.2 Stress assignment in Cairene Arabic

Stress in Cairene Arabic is almost entirely predictable. Description of stress placement in CA, following McCarthy 1979, Halle & Vergnaud 1987 (cited in Youssef & Mazurkewich (1998), is as follows. Stress always falls on one of the last three syllables of the word. The structure of the syllables within a word determines which of the three final syllables receives stress:

Stress is on the last syllable if it is superheavy (CVVC or CVCC):

- (4) a. darábt 'I/ you beat'
b. haggáat 'pilgrims' (fem.)

Otherwise, stress is on the penult, if it is heavy (CVC or CVV):

- (5) a. mibáhbah 'easy going'
 b. mabáahis 'police investigation department'
 c. katábtí 'you (fem. sg.) wrote'

Otherwise, stress is on the antepenult or the penult, whichever is separated by an even number of syllables from the immediately preceding CVC or CVV syllable, if there is one, or the beginning of the word if there are none, where zero separation is counted as even:

- (6) a. madrása 'school'
 b. muxtálifa 'different (adj. s.f.)'
 c. fágara 'tree'

While a heavy (CVC or CVV) syllable attracts stress in penultimate position, only a superheavy (CVVC or CVCC) syllable can be stressed in word-final position. Thus, the weight of CVC syllables in Arabic has been considered to be variable depending on position in the word (Broselow, Chen, & Huffman, 1997; Rosenthal & Van der Hulst, 1999). If CVC is word-internal it patterns as heavy, while in final position it patterns as light. The theoretical justification for considering CVC in final word position as light is that word-final consonants do not add to the weight of a syllable, often being considered extrasyllabic or extraprosodic.

2.3 Minimal word size in Cairene Arabic

Well-established phonological analyses in the literature demonstrate that some languages require content words to consist of some minimal size, often two syllables or two moras (Kenstowicz 1994). In CA, a monosyllabic content word must be superheavy, CVVC or CVCC. As discussed above, a final consonant does not add to the weight of a syllable, so only superheavy syllables reach the minimum size of two moras.

The experiment described in the next section is designed to investigate the role of prosody in word segmentation.

3. Experiment

Based on the fact that CA has predictable stress, CA listeners can be expected to show evidence of a stress-based segmentation procedure. Specifically, if stressed syllables are more salient than unstressed syllables, we might expect CA listeners to spot a word in a stressed position more easily than the same word in a position that

is not stressed. In other words, the experiment was conducted with the prediction that CA listeners would segment, then initiate lexical searches to recognize spoken words in connected speech based on the position and distribution of stress in the stimuli.

In order to test this hypothesis a word spotting study was performed. This study was based on the methodology of Cutler & Norris 1988, with adaptation for CA-speaking listeners.

3.1 Methodology

One hundred and nine female and male subjects between the ages of 25 to 50 volunteered to participate in the study. They were randomly chosen and randomly divided into six groups. Subjects were tested individually and were instructed that they would hear nonsense words in which real CA words were embedded; they were told to press a button whenever they spotted a real word, and were also instructed to utter the spotted word aloud, which in turn was recorded on a separate tape recorder. E-Prime Software (Schneider, Eschman, & Zuccolotto, 2002) handled the audio presentation and the sound file playback as well as the input collection (i.e. response time). Reaction time was measured from the burst of the coda consonant of the first syllable of the string until the subject pressed a button on the response box.

A counterbalanced design was constructed which included six lists, each containing the following: (i) 67 non-word disyllabic and trisyllabic items used as distractors, (ii) 20 test items, ten difficult and ten easy monosyllabic words embedded in the same prosodic context as the experimental items, and (iii) 9 (SS), (SW), and (SwS) experimental items.

The 20 test items were used as a benchmark to check for the difficulty of the experimental items. Difficulty of the test items was defined in terms of the frequency of a given word. Difficult items were words that are very low in frequency, e.g. [biʃt] 'cloak', whereas easy ones were words that are high in frequency, [zibn] 'son'. The experimental items consisted of three different prosodic contexts, namely heavy but unstressed syllable followed by a superheavy stressed syllable, represented as (SS), a heavy stressed syllable followed by a final heavy but unstressed syllable, represented as (SW), and a heavy but unstressed syllable followed by a light then a superheavy stressed syllable, represented as (SwS). Boldface here indicates stress. Note that I use the symbol (W) to refer to the syllable as weak, i.e. unstressed. The second syllables in the (SW) and (SwS) attract no stress, the former because CVC syllables pattern as light in final position in Cairene Arabic, as mentioned earlier, and the latter because it is an open syllable CV.

The embedded words were monosyllabic words all ending in a consonant cluster (e.g. fardⁱ 'obligation') in one of three contexts:

- (7) Stimuli: real CA monosyllabic words were inserted as the initial syllable in the following conditions.
 - a. Final stress
 - (SS): a strong syllable with a long vowel (fardⁱuuf).
 - (SwS): a weak syllable with an inserted vowel followed by a super-heavy syllable (fardⁱilakf).
 - b. Initial stress
 - (SW): a weak syllable with a short vowel (fardⁱut).

Because a final superheavy syllable attracts stress, the (SS) and (SwS) forms have final stress, while stress falls on the initial syllable in (SW) forms.

The stimuli were constructed to simulate CA words as much as possible. Thus the second and third syllables that were added to the real words were of different syllable types and in fact were all endings that occur in words in CA. (See Appendix A for the list of all the words used).

A score of (1) was given only to a correct segmentation and recognition of the spoken word which accompanied a recorded RT on the software and also a recorded word produced by the subject onto the tape. No score was given if: (i) the word orally produced was unrelated even if the RT was recorded by the software, (ii) the elicited word was unintelligible, (iii) the participant repeated the entire stimulus with no detection of an embedded word, (iv) RT was recorded on the software but there was no corresponding oral production, (v) RT was absent but the word was uttered correctly.

The experiment followed a one-shot, repeated-measures design where the independent variable is the structure of the non-words (SS, SW, SwS) and CA prosody and the dependent variable is the detection latency of the embedded CA word and its miss rate.

3.2 Results

3.2.1 Reaction times and miss rate

Since this was the first time such an experiment was conducted on CA, and no previous knowledge of how difficult the task of detecting a word in the initial portion of a disyllabic and trisyllabic non-word would be, the twenty test items (i.e. easy vs. difficult) were inspected first and used as a benchmark. Their means were calculated and the mean that was in the range between the mean for the difficult test words and that for the easy ones was taken as benchmark for the experimental items range of difficulty. For example, the RT mean for the 'easy' words was 989.2 msec and the mean for 'difficult' words was 1222.4 msec. The grand mean RT to

experimental items was 1000.6 msec, which was in the range between the mean for the difficult test word items and that for the easy ones.

Calculation of miss rate of 'easy' versus 'difficult' test words showed that difficult words were missed by the subjects more than the easy ones. The following table illustrates the difference between the miss rates of the difficult and easy test words.

Table 1. Miss rate in difficult and easy items as benchmark

	N	Minimum	Maximum	Mean	Std. Deviation
Difficult	6	52.00	89.00	72.66	14.10
Easy	6	14.00	25.00	19.66	4.32
Valid N (listwise)	6				

The difference is significant, $t(5) = 8.401$, $p.000$. Thus the researcher concluded that the experimental items were within suitable range. However, one item [fahn] 'freight' was discarded because it could be interpreted as [fah] 'became scarce' and therefore this item and its matches were disregarded from the analysis for purposes of balance. Hence, the number of items was 8 per list.

Separate analyses were conducted for every subject and item where the distribution of RTs was calculated. Responses that were more than 2.5 standard deviations from the mean (either very long or very short) were disregarded.

Additionally, subject analysis indicated that for some orders there were more subjects than for others. For purposes of a balanced design and the statistical assumption of equal variances, a number of subjects were randomly dropped from the analysis. Thus for each list group there were thirteen subjects, making the total 78 subjects. However, in the phonological analysis of the experiment all the subjects' elicitations (i.e. 109) were inspected and analyzed.

Mean reaction times for (SS), (SW), and (SwS) are shown in table (2) and figure (1). Cutoff points were established at two standard deviations below or above the mean response of each item. Table 2 below includes data within the cutoff points.

Table 2. RT means for SS, SW, SwS

	N	Minimum	Maximum	Mean	Std. Deviation
SSMean	47	551.38	1520.00	1018.19	203.25500
SWMean	48	501.00	1461.00	926.47	208.01293
SwSMean	48	765.77	1724.50	1058.37	183.92695
Valid N (listwise)	47				

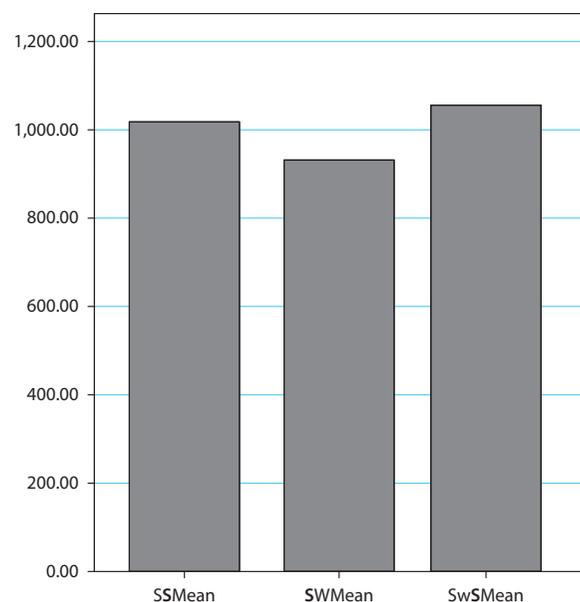


Figure 1. RT means of SS vs. SW, vs. SwS

Analysis of variance was run on the items as a random factor and the difference between the three contexts (i.e. SS, SW, SwS) was statistically significant; $F(2, 92) = 5.056, p = .008$. Post hoc t tests showed that the difference in the means between (SS) vs. (SW) and that between (SW) and (SwS) was also statistically significant; $t(46) = 2.270, p = .028$ and $t(47) = 3.467, p = .001$.

As for the difference between (SS) and (SwS), it was not significant. Subjects analysis also showed significant difference; $F(2, 150) = 13.652, p = .000$. Post hoc t tests demonstrated that the mean difference between (SS) and (SW) was significant; $t(75) = 3.981, p = .000$; and $t(75) = 5.079, p = .000$ for the mean difference between (SW) and (SwS). The mean difference between (SS) and (SwS) was found not to be significant.

Miss rate was calculated also by E-Prime. The software tabulated each time the subject did not press the button to indicate that the embedded word was identified. The mean miss rate was quite high for the three prosodic contexts (SS, SW, SwS) 35, 33, and 31 respectively. Note that none of the participants had participated in a psycholinguistic experiment before, which may explain the high miss rate.

Table 3. Miss rate percentage in spotting embedded word in SS, SW, and SwS

	N	Minimum	Maximum	Mean	Std. Deviation
SSMissPercent	13	29.73	38.10	34.5756	2.17306
SWMissPercent	13	28.57	40.54	33.5943	3.78561
SwSMissPercent	13	26.32	37.74	31.8301	3.51912
Valid N (listwise)					

A slight difference was observed in the (SwS) context. However, analysis of variance did not show any statistical significance in the difference among the three contexts. See figure (2) below which illustrates the difference in miss rate as calculated by E-Prime software.

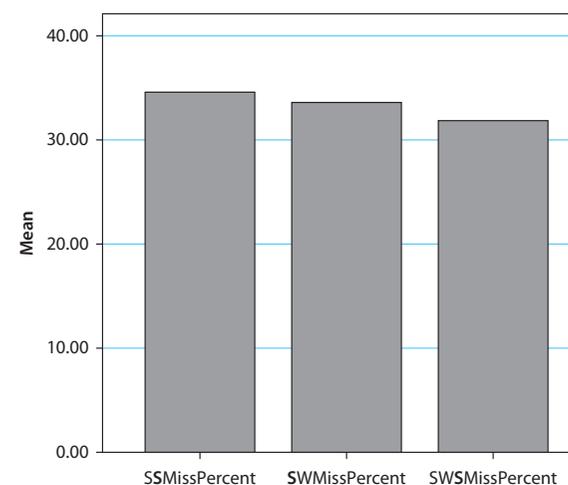


Figure 2. Miss rate in SS vs. SW, vs. SwS

3.2.2 Error type

Phonological analysis was undertaken. All of the items in their original number were analyzed (i.e. fifty four items), and all 109 subjects were included in the analysis. Ninety seven percent of all the cases across the three different syllabic contexts, (SS), (SW), (SwS) resulted in a correct segmentation, i.e. CVCC *far*^f. The analysis revealed that some subjects (3% of the cases) wrongly segmented the stimuli, resulting in mistakes of two types, CVCC and CVVC, as shown in Table 4.

Table 4. Syllable types in elicited errors

	Number of cases	Percentage
CVCC type	21	22.5
CVVC type	72	77.4
Total	93	

As seen in the table, in 77.4 % of the 93 cases, the participants segmented and thus produced an embedded word conforming to a CVVC monosyllabic shape. Table 5 shows the distribution of errors across the three syllabic contexts. (See Appendix B for list of mistakes produced by subjects).

Table 5. Error type across the three syllabic contexts

	SS	SW	SWS
CVVC	56%	32%	12%
CVCC	24%	38%	38%

The data in the table shows that the syllabic context may not have had an effect as the percentages are all around chance level. However, as indicated above, the cases of CVVC productions are the most numerous, specifically in the (SS) syllabic context. It is interesting to note that CVVC productions are quite rare in SwS contexts.

3.3 Discussion

The conducted experiment has two main findings. The first is that reaction time was faster when the onset of the embedded word coincided with the onset of the stressed syllable. The second finding is that the initial CVC of the embedded word was sometimes identified as a CVVC or a CVGeminate word, i.e. CVCC; however, there are more cases of a CVVC monosyllabic word production as demonstrated by the percentages of the cases.

The results of the experiment are as the hypothesis predicted, namely that CA would show some preference for a stress-based segmentation procedure. Words in initial-stress contexts (e.g. fard¹ut) had shorter detection latency than words in final stress contexts (fard¹uuf) and (fard¹ilak¹). Furthermore, phonological analysis shows that the elicited ‘false recognition’ data is in conformity with CA syllable structure constraints. For example in [fard¹uuf], instead of segmenting after [d¹] to recover the actual word [fard¹], in 3% of the cases participants segmented it after the [r] and produced [farr] ‘*spaced*’ with geminated [r] or [faar] ‘*mouse*’ with lengthened vowel. Both of these words are real CA words.

(8)	Instead of	Produced
a.	fard ¹ uuf [fard ¹] ‘ <i>duty</i> ’	→ [faar] ‘ <i>mouse</i> ’
b.	burgaaʃ [burg] ‘ <i>tower</i> ’	→ [buur].‘ <i>barren</i> ’
c.	serdut [serd] ‘ <i>recital</i> ’	→ [sirr]. ‘ <i>secret</i> ’
d.	burs ¹ ukuuʃ [burs ¹] ‘ <i>lizard</i> ’	→ [barr]. ‘ <i>land</i> ’

These segmentations demonstrate the lexical hypotheses participants entertained and the competition between the generated candidates. Importantly, both these segmentations are consistent with CA phonology which neutralizes the contrast between CVVC and CVC and the contrast between CVGeminate and CVC in word and phrase internal in connected speech. If the entire sequence is analyzed as a single word, then underlying [faar] would be pronounced as [far] in this context, since CVVC syllables are not permitted word-internally. If the sequence is analyzed as containing two words, then underlying [farr] would be pronounced as [far] in phrase-final position, since phrase-final geminates are typically shortened. In contrast, no participants produced CVC (e.g. [far]) as the embedded word, because such a word would not meet the minimal word size requirements for CA, in which all monosyllables must be superheavy.

Participants may also have shown an effect of the Cairene Arabic requirement that all syllables begin with a consonant onset. Returning to cases where the subjects segmented at the first strong yet unstressed syllable as in (SS), inserting a segmenting point after the first consonant of the first syllable’s coda [r] makes the residual material (i.e. second syllable) a licit structure because it includes an onset. In contrast, segmenting after the second coda consonant of the cluster would result in residual material that was illicit (i.e. a syllable starting with a vowel) (Cutler, Demuth, & McQueen, 2001).

Results favoring spotting real CA words in (SW) contexts over (SS) are strong indication that CA uses stress in segmenting speech. Segmentation and recognition of the real word is faster in (SW) contexts. For example, the real word ‘fard¹’ was spotted more quickly in ‘fard¹ut’ than in the nonsense string ‘fard¹uuf’. If ‘fard¹uuf’ is initially segmented into ‘far’ and ‘d¹uuf’ then in order to spot and segment ‘fard¹’ the listener must gather material on both sides of the segmentation point. However, such interference would not occur in the (SW) context because the second unstressed syllable would not prompt any lexical search.

Returning to the finding with the (SwS) contexts, I would like to argue once again for stress as a perceptual unit in the segmentation of CA connected speech. Although the RT results showed that (SwS) syllabic contexts had the longest reaction time, miss rate percentage and false recognition errors are the lowest in this category. Perhaps in this context, because stress is on the final syllable, listeners may have initially segmented the speech string accordingly and then backtracked to recover the embedded word. Although there is little direct empirical evidence

that listeners may repair faulty prosody-driven segmentation by backtracking to information presented earlier in the input, retroactive parsing as a general mechanism has been documented in the literature of spoken word recognition (Cluff & Luce, 1990; Grosjean, 1985; Mattys & Samuel, 2000). Such backtracking could explain why SwS contexts had the slowest reaction time, despite having the least number of miss rate as well as false recognition errors.

Because of the limitations of the present study, the results of the experiment should be interpreted with caution. Due to the unavailability of spoken Arabic corpora for analysis, a frequency check could not be carried out, so the frequency of vocabulary items was not controlled. Also, a rating of the items by native speakers on a scale of 0–5, (5 sounds native and 0 sounds nonnative) prior to the administration of the experiment would have given the test items more face validity. Despite the above limitations, the results are suggestive of the segmentation strategies used by Cairene Arabic speakers.

4. Conclusion

The word spotting experiment shows that real words were spotted and recognized faster in initial-stress (SW) contexts than real words in the final-stress contexts, namely SS and SwS, supporting the claim that Cairene Arabic speakers use stress in word segmentation. The identification of surface CVC as embedded words of type CVVC or CVGeminat were consistent with the phonological processes of this language. Although miss rate data as well as phonological errors or false recognition data do not point towards a certain prosodic context's dominance in segmentation, it is noteworthy to mention that SwS syllabic contexts had the lowest miss rates as well as the smallest number of false recognition type errors. This may suggest that a retroactive backtracking mechanism may have been adopted to spot the embedded word.

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Appendix A

Replication of Cutler & Norris (1988)

Experimental words

Item	Meaning	Item	Meaning	Item	Meaning
fʻard	parcel	ʔardʻ	earth	farʻ	obligation
fahr	excavation	naʻr	erosion	baʻr	sea
ʔamr	order	gamr	coal	tamr	dates
sʻaʔr	hawk	naʔr	pecking	faʔr	poverty
fahr	month	dahr	decade	mahr	dowry
gerd	inventory	werd	flowers	serd	narration
ʔahl	family	sahl	easy	gahl	ignorance
rigl	leg	figl	radish	sigl	calf
suhd	sleeplessness	zuhd	renunciation	guhđ	effort

Experimental words (Continued)

Item	Meaning	Item	Meaning	Item	Meaning
bursʻ	lizard	ʔursʻ	disc	xursʻ	dumb
magđ	glory	wağđ	love	naʔđ	plateau in Saudi Arabia
madh	praise	radh	woman quarrel	Kadh	struggle
mahw	eradication	naʻw	syntax	sʻaʻw	bright
xurg	cloth- saddlebag	durg	drawer	burg	tower
fahn	freight	sʻahn	plate	tʻahn	grinding
badr	full moon	nadr	vow	Kadr	frame
rasm	drawing	kasm	figure	Dasm	fat
bikr	first born	fikr	thought	Zikr	mention

List orders

1	SS	SW	SwS	2	SS	SW	SwS
#							
1	fʻarduuf	tʻardut	tʻardilakf		ʔardʻuuf	ʔardʻut	ʔardʻilakf
2	fahriis	fahriʻ	fahriiliif		naʻr	naʻriʻ	naʻriiliif
3	fahraat	fahrar	fahriilaat		dahraat	dahrar	Dahriilaat
4	ʔahluub	ʔahlus	ʔahlinaaf		sahluub	sahlus	sahlinaaf
5	rigluuf	riglis	riglikuuf		figluuf	figlis	figlikuuf
6	magdakf	magduʻ	magdinaaf		wagdakf	wagduʻ	wagdinaaf
7	ʔurgaaʻ	ʔurgud	ʔurgilakf		durgaaʻ	durgud	durgilakf
8	fursukf	fursig	fursukuuf		tʻurfukf	tʻurfig	tʻurfukuuf
9	fahniiʻ	fahnar	fahnilaat		rahniiʻ	rahnar	rahnilaat

3	SS	SW	SwS	4	SS	SW	SwS
#							
1	farʻduuf	farʻut	farʻilakf		werduuf	werdut	werdilakf
2	baʻriis	baʻriʻ	baʻriiliif		naʔriis	naʔriʻ	naʔriiliif
3	mahraat	mahrar	mahrilaat		ʔahraat	ʔahrar	ʔahrilaat
4	gahluub	gahlus	gahlinaaf		fahluub	fahlus	fahlinaaf
5	sigluuf	siglis	siglikuuf		hikruuf	hikris	hikrikuuf
6	nagdakf	nagduʻ	nagdinaaf		mahdikf	mahduʻ	mahdunaaf

(Continued)

List orders (Continued)

3	SS	SW	SwS	4	SS	SW	SwS
#							
7	burgaaf	burgud	burgilakf		gu ^ʔ taaf	gu ^ʔ stud	gustilakf
8	t ^ʔ urfukf	t ^ʔ urfig	t ^ʔ urfukuu		burs ^ʔ ikf	burs ^ʔ if	burs ^ʔ ukuu
9	t ^ʔ ahnii	t ^ʔ ahnar	t ^ʔ ahnilaat		wahnii	wahnar	Wahnilaat

5	SS	SW	SwS	6	SS	SW	SwS
#							
1	gerduuf	gerdut	gerdilakf		serduuf	serdut	serdilakf
2	fa ^ʔ riis	fa ^ʔ riis	fa ^ʔ riliif		s ^ʔ a ^ʔ riis	s ^ʔ a ^ʔ riis	s ^ʔ a ^ʔ riliif
3	t ^ʔ uhraat	t ^ʔ uhrar	t ^ʔ uhrilaat		nahraat	nahrar	nahrilaat
4	nahluub	nahlus	nahlinaaf		sahluub	sahlus	sahlinaaf
5	fikruuf	fikris	fikrikuuf		zikruuf	zikris	zikrikuuf
6	ʔahdikf	ʔahdu ^ʔ	ʔahdinaaf		fahdikf	fahdu ^ʔ	fahdinaaf
7	busdaaf	busdud	busdilakf		guhdaaf	guhdu ^ʔ	guhdilakf
8	xursikf	xursig	xursukuuf		ʔurfikf	ʔurfig	ʔurfukuuf
9	muhniif	muhnar	muhnilaat		duhniif	duhnar	duhnilaat

Appendix B

CA competing lexical candidates CVVC vs. CVCC mistakes per syllable context

#	Origin	Syllable type		
		CVVC	Context	Total
1	ʔurgilakf	huur	SwS	1
2	burgaaf	buur	SS	3
3	burgilakf	boor	SW	2
4	burs ^ʔ ig	buur	SS	2
5	burs ^ʔ ikf	buur	SS	2
6	dahrilaat	t ^ʔ aal	SwS	1
7	durgaa	door	SS	4
8	durgilakf	door	SwS	2
9	fard ^ʔ ut	faar	SW	7

Appendix B (Continued)

#	Origin	Syllable type		
		CVVC	Context	Total
10	fard ^ʔ uuf	faar	SS	6
11	furs ^ʔ ig	foor	SW	3
12	furs ^ʔ ukf	fuur	SS	3
		foor	SS	2
13	furs ^ʔ ukuuf	foor	SwS	2
14	gustaaf	guu ^ʔ	SS	6
15	gustilakf	guu ^ʔ	SwS	2
16	gustud	qaat	SW	2
17	magdakf	maag	SS	1
18	na ^ʔ riis	naar	SW	1
19	s ^ʔ a ^ʔ riis	s ^ʔ a ^ʔ aah	SW	1
20	serdut	s ^ʔ aar	SW	2
21	serduuf	s ^ʔ aar	SS	2
22	t ^ʔ ardut	t ^ʔ aar	SW	1
23	t ^ʔ urfig	t ^ʔ oor	SW	3
24	t ^ʔ urfukf	t ^ʔ oor	SS	5
25	t ^ʔ urfukuuf	t ^ʔ oor	SwS	2
26	wahnii	waah	SS	1
28	xursikf	xuur	SS	2
29	xursig	xuur	SW	1
	Total			72

#	Origin	Syllable type		
		CVCC	Context	Total
1	ʔahdikf	fahh	SS	1
2	ʔurgaa	hurr	SS	1
3	ʔurfukuuf	ʔurr	SwS	3
4	ʔurfig	ʔeʃf	SW	1
5	ʔurgud	sirr	SW	1
6	bugdud	burr	SW	1
7	burgilakf	burr	SwS	1

(Continued)

(Continued)

#	Origin	Syllable type		
		CVCC	Context	Total
		barr		1
8	burs ^s ukuuf	barr	SwS	1
9	duhnar	duff	SW	1
10	durgud	durr	SW	2
11	furs ^s ukf	farr	SS	1
12	gustud	guʃ	SW	1
13	magdinaaf	mugg	SwS	1
14	serdilakf	sirr	SwS	1
15	serduuf	sirr	SS	2
16	serdut	sirr	SW	1
	Total			21

Regressive voicing assimilation in Cairene Arabic*

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Cairene Arabic licenses voicing contrast in obstruents in most positions. However, within sequences all obstruents must agree in voicing. In clusters of obstruents, the voicing of the first obstruent assimilates to that of the second. This paper presents an account of regressive voicing assimilation, as well as the arguments that the feature [voice] must be binary in this language. This paper considers the role of guttural consonants in voicing assimilation. The major finding is that guttural sounds fall into two classes: some gutturals pattern with sonorant consonants, while other gutturals participate in voicing assimilation.

1. Introduction

Cross-linguistically, sequences of obstruents that do not agree in voicing are generally avoided. Cairene Arabic (henceforth CA) is a language that requires adjacent obstruents to agree in [voice]. The phonological process that enforces this requirement is regressive voicing assimilation, in which the voicing specification of the second member of the cluster determines the voicing of the entire cluster. Regressive voicing assimilation occurs in both word-internal and word-final position. This paper examines CA regressive voicing assimilation in the framework of Optimality Theory (Prince & Smolensky 1993/2002) (henceforth OT), and Correspondence Theory (McCarthy & Prince 1995). I argue that the feature [voice] in CA is binary, based on the fact that both values are involved in this assimilation: the first obstruent takes on the voicing specification, either [+voice] or [-voice], of a following obstruent.

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The rest of the paper is organized as follows. In Section 2, I give a description of the facts of regressive voicing assimilation in Cairene Arabic, followed by a description of methodology and data gathering. In Section 3, I introduce OT and the constraints that are relevant for the analysis followed by analysis of regressive assimilation in obstruent clusters. Section 4 provides analysis of CA gutturals with respect to this phonological process (regressive voicing assimilation). Section 5 concludes the paper with a summary of the findings.

2. The facts of CA regressive voicing assimilation

2.1 Consonant clusters and syllable structure in CA

CA allows voicing contrasts in word-initial position (e.g. *taab* ‘repented’ vs. *daab* ‘melted’), in word-final position (e.g. *beet* ‘house’ vs. *beed^f* ‘eggs’), between vowels (e.g. *fakar* ‘he thanked’ vs. *fagar* ‘trees’), and before sonorant consonants (e.g. *rut^fn* ‘cotton’ vs. *hud^fn* ‘embrace’).

Clusters that agree in voice maintain their underlying voice value on the surface both in word-final and intervocalic positions. In examples (1) and (2), the underlying value of the consonants surfaces in other templatic realizations of the stem, where a vowel breaks up the cluster.

(1) Word-Final Voicing Contrast

- | | | | |
|----|--------------------------|------------|------------------------|
| a. | mag <u>d</u> | ‘glory’ | cf. maagid |
| b. | nab <u>d^f</u> | ‘pulse’ | cf. nabad ^f |
| c. | mif <u>t^f</u> | ‘comb’ | cf. mafat ^f |
| d. | kit <u>f</u> | ‘shoulder’ | cf. kitaaf |

(2) Intervocalic Voicing Contrast

- | | | | |
|----|------------------|----------------------|-------------|
| a. | mak <u>s</u> ab | ‘profit’ | cf. kisib |
| b. | jik <u>t</u> ib | ‘he writes’ | cf. katab |
| c. | mad <u>b</u> ah | ‘slaughtering house’ | cf. dabah |
| d. | mag <u>z</u> ara | ‘massacre’ | cf. gazzaar |

In intervocalic obstruent-sonorant clusters, the obstruent maintains its voicing, as the following examples show.

(3) Voicing Contrast Before Sonorants

- | | | | |
|----|------------------------------|-------------------|-------------------------|
| a. | mut ^r <u>r</u> ib | ‘male singer’ | cf. t ^r arab |
| b. | mud ^r <u>r</u> ib | ‘he is on strike’ | cf. d ^r arab |
| c. | jizra <u>r</u> | ‘he planted’ | cf. zara <u>r</u> |
| d. | jisra <u>h</u> | ‘he wonders’ | cf. sarah |

However, surface sequences of adjacent obstruents always agree in voicing, as can be seen in examples (4).

(4) Regressive Voicing Assimilation

	Input	Output	Gloss	Verbs
a.	ʃab <u>k</u> a	ʃap <u>k</u> a	‘jewelry’	ʃabak
b.	mat <u>b</u> ax	mad <u>b</u> ax	‘kitchen’	t ^r abax

In CA, as in most of the Arabic dialects, superheavy syllables of the type CVVC and CVCC are restricted to word-final position. This is illustrated in the examples in (1). However, in medial position a /VCCV/ sequence is always syllabified as VC.CV. Thus, in the examples in (3) and (4) all the intervocalic clusters are broken up by a syllable boundary where the first consonant syllabifies as a coda to the first syllable whereas the second consonant provides an onset to the second syllable.

Evidence for this syllabification comes from the absence of any word-initial complex onsets, the restriction of complex codas to phrase-final position, and from the stress facts in the language.

In CA, stress falls on the antepenultimate in three light syllable words (e.g. *ká.ta.bu* ‘he wrote it (m)’), whereas in words consisting of light-heavy-light syllables, stress is penultimate (e.g. *ka.táb.lu* ‘he wrote to him’). Penultimate stress lends evidence for the syllabification of *b* as a coda to the second syllable rather than the first consonant in a complex onset, as in the ungrammatical form **ká.ta.blu*. Similarly, stress falls on the penultimate syllable in words like *mad.rá.sa* ‘school’ with heavy-light-light syllables. If [dr] formed a complex onset, we would expect **má.dra.sa* with antepenultimate stress for a sequence of three light syllables.

To summarize, CA allows voicing contrasts in word-initial, word-final as well as intervocalic positions both in single consonants and in consonant clusters. However, adjacent obstruents that differ in underlying voicing always agree on the surface. This will be the subject of the next section.

2.2 Regressive voicing assimilation

When an underlying voiced obstruent occurs before a voiceless obstruent, the first obstruent is devoiced. Representative examples are given in (5). The obstruents in question are underlined. The underlying value of each consonant surfaces in other templatic realizations of the stem (mostly verbs) where a vowel breaks up the cluster.

(5) *Regressive Devoicing in Intervocalic and Word-Final obstruent clusters*

	Input	Output	Gloss	Verbs
a.	ʔagsaam	ʔaksaam	“bodies”	gism
b.	ʃabka	ʃapka	“jewelry”	ʃabak
c.	taɖfiin	taɖfiin	“inauguration”	daɖʃan
d.	yiɖfaɾ	yiɖfaɾ	“he pays”	daɖfaɾ
e.	kabɪ	kapt	“oppression”	kabat

Regressive voicing assimilation in CA also causes an underlying voiceless obstruent to become voiced before a voiced obstruent, as exemplified by the words in (6) and (7), respectively.

(6) *Regressive Voicing Assimilation in Intervocalic Obstruent Clusters*

	Input	Output	Gloss	Verbs
a.	yiɪbaħ	yiɪbaħ	“he swims”	cf. sabah
b.	xat ^h ba	xad ^h ba	“a match maker”	cf. xat ^h ab
c.	ʔakzaxana	ʔagzaxaana	“pharmacy”	
d.	ʔakbar	ʔagbar	“older”	cf. kibir
f.	ʔafz ^h aɾ	ʔavz ^h aɾ	“more horrible”	cf. faz ^h iir
g.	mat ^h bax	mad ^h bax	“kitchen”	cf. t ^h abax
h.	tɪɪbat ^h	tɪɪbat ^h	“clings to”	cf. ʃabat ^h

(7) *Regressive Voicing Assimilation in Word-Final Obstruent Clusters*

a.	nas ^h b	naz ^h b	“cheating”	cf. nas ^h ab
b.	faxd	fayd	“thigh”	cf. fuxuud
c.	rafɪ	rayd	“firing”	cf. rafad

The set of data given in (5–7) shows that regressive assimilation is employed in CA to avoid a sequence of two obstruents that disagree in the feature [voice].

2.3 Methodology and data gathering

To investigate regressive voicing assimilation in consonant clusters in CA, I collected data in Cairo in the course of six trips, each lasting one month, over a period of two years. One set of data was collected from TV series, TV programs, songs and interactions with native speakers of CA. The second set of data was elicited from native speakers who read two word lists which the author prepared. The first list consisted of 100 words containing obstruent clusters in word-medial or word-final position. Each cluster contained an underlying sequence of voiceless-voiced or voiced-voiceless obstruents. The second list contained 50 words which combined obstruents with the class of sounds known as gutturals. The guttural sounds occurred before or after voiced or voiceless obstruents. Five native speakers of CA were asked to read the word list and their responses were taped. The informants who participated in the data gathering all held B.A degrees. Three of the informants

were females and two were males. Their ages ranged between 32–45 years of age. The written forms of the word lists were in MSA.

In interpreting the data, I relied on phonetic transcription. The data were first transcribed by the author and a second time by another phonologist. Both transcribers agreed on the forms that were transcribed, as far as the voice value of the consonants in question is concerned.

3. Analysis of voicing assimilation

In this section, I analyze the CA data beginning with word-medial obstruent clusters followed by analysis of a sequence of two obstruents in word-final position. The analysis of assimilation is done in an OT framework (Prince & Smolensky 1993/2002, & McCarthy & Prince 1993, 1995). Three types of constraints interact in regressive voicing assimilation: markedness constraints, faithfulness constraints, and positional faithfulness constraints. The AGREE constraint (Lombardi 1996) forces adjacent obstruents to have the same value for the feature [voice]. Faithfulness constraints (McCarthy & Prince 1995) require faithful mapping of inputs into their corresponding outputs, thereby ensuring that underlying voicing contrasts are realized on the surface. Positional faithfulness constraints (Beckman 1997, 1998; Lombardi 1996; Petrova et.al 2006) may require more faithful mapping in certain positions in prosodic words. These constraints may determine the direction of assimilation, whether regressive or progressive, by demanding faithfulness in specific positions. The privileged positions relevant for the discussion of assimilation include onsets of syllables and word-final positions. In the section which follows, I discuss these constraints and how they play out in regressive voicing assimilation.

3.1 Regressive assimilation in intervocalic obstruent clusters

In the examples in (5), all the voiced codas of the first syllable are followed by voiceless onsets. Since a sequence of obstruents that disagrees in voicing is not allowed, these lexical representations cannot be realized faithfully, and the first obstruent, a coda, is devoiced. Two constraints are needed to show this outcome. The AGREE_{VOICE(OBS)} constraint bars obstruents which disagree in [voice], spelled out in (8).

- (8) AGREE_{VOICE(OBSTRUENTS)} (Lombardi 1996)
Obstruent clusters should agree in voicing.

The second constraint IDENT_{VOICE} (ID_{voi}), shown in (9), requires faithful mapping of the laryngeal feature specification of an input into its corresponding output.

Here I assume a binary feature opposition, [-voice] or [+voice], as assumed by Rubach (1996), Wetzels & Mascaro (2001), Petrova et al. (2006), among others. This contrasts with the approach which assumes that [voice] is a privative feature; in other words, that voiced and voiceless obstruents differ in the lack of any voicing specification vs. specification of a unary [voice] feature, as in e.g. Lombardi (1991), Abu Mansour (1996).

- (9) IDENT voice (IDvoi) (Petrova et. al. 2006)
Correspondent input and output segments have the same specification for [voice].

In tableau (10), output (10a) has a voiced coda that disagrees with the following onset, thus incurring a fatal violation of the agreement constraint. Candidate (10b) has one mark of violation of the identity constraint allowing it to emerge as the winner.

- (10) AGREE_{VOICE(OBS)} » IDvoice
Input /ʔagsaam/ “bodies”

	AGREE _{VOICE(OBS)}	IDvoi
a. ʔagsaam	*!	
☞ b. ʔaksaam		*

In Lombardi’s analysis of assimilation, the AGREE [voice] constraint is the constraint that compels assimilation. However, assimilation can go in either direction, i.e. it can be progressive or regressive. As tableau (11) demonstrates, AGREE alone cannot determine the winning candidate because it is satisfied by both outputs (11b), and (11c). Furthermore, the ranking in (11) yields two winners. Another constraint must come into play to determine how the conflict should be resolved – whether a coda is the segment that undergoes the change or the onset.

- (11) AGREE_{VOICE(OBS)} » IDvoice
Input /masduud/ “blocked”

	AGREE _{VOICE(OBS)}	IDvoi
a. masduud	*!	
☞ b. mastuut		*!
☞ c. mazduud		*!

Cross-linguistically, certain positions require more faithfulness than others (McCarthy & Prince (1995), Beckman (1997, 1998), Lombardi (1999), and Petrova et.al (2006)), among others. Within syllables, onsets are privileged positions in that underlying contrasts are more likely to be maintained in onsets than codas. This

difference has been ascribed to the “pervasiveness of onset saliency” (Hawkins & Cutler (1988)). The positional faithfulness constraint responsible for maintaining the identity of onsets is given in (12).

- (12) IDENT ONSET VOICE (IDONVOICE) (Lombardi 1996)
Onsets should be faithful to underlying laryngeal specification.
- (13) IDONVOICE » AGREE_{VOICE(OBS)} » IDvoi
Input /masduud/ “blocked”

	IDONVOICE	AGREE _{VOICE(OBS)}	IDvoi
a. masduud		*!	
b. mastuut	*!		*
☞ c. mazduud			*

In tableau (13), the positional faithfulness constraint outranks the agreement constraint. This ranking is based on the fact that, although both (13b) and (13c) satisfy AGREE, only (13c) obeys the positional faithfulness constraint, rendering it optimal.

3.2 Word-final regressive assimilation

Using the same ranking that has been established thus far, I also consider word-final clusters which exhibit regressive assimilation. While we can ensure regressive assimilation in intervocalic clusters, since the second C will always be an onset while the first C will be a coda, that does not apply to word-final CC clusters in which both C’s are in the coda position. As tableau (14) demonstrates, utilizing the ranking in (13) does not yield the desired output, thus suggesting that another constraint might be at play here.

- (14) IDONVOICE » AGREE_{VOICE(OBS)} » IDvoi
Input /naSb/ “cheating”

	IDONVOICE	AGREE _{VOICE(OBS)}	IDvoi
a. naSb		*!	
☞ b. naSp			*
c. naZb			*

We can account for this pattern by assuming that words with complex codas are subject to the identity constraint in (15), proposed by Petrova et.al (2006).

- (15) ID-Word-Final Voice (IDwf voi) (Petrova et.al 2006)
Correspondent input and output word-final obstruents must have the same specification for voice.

This positional faithfulness constraint imposes faithful mapping of feature specification of obstruents at the right edge of prosodic words. It therefore ensures the direction of assimilation to be regressive. Consider tableau (16).

- (16) IDwf voi » AGREE_{VOICE(OBS)} » IDvoi
Input /naSb/ “cheating”, /kabt/ “oppression”

	IDwf voi	AGREE _{VOICE(OBS)}	IDvoi
a. naSb		*!	
b. naSp	*!		*
☞ c. naZb			*
Input [kabt]			
d. kabt		*!	
e. kabd	*!		*
☞ f. kapt			*

Candidate (16a) incurs a fatal violation of the agreement constraint. Both outputs (16b) and (16c) fare equally well with respect to the first constraint. However, candidate (16c) bests its rival by obeying the identity constraint of the obstruent in word-final position. Candidates (16d) and (16e) are ruled out by the agreement constraint and the positional faithfulness constraint, respectively, rendering (16f) optimal.

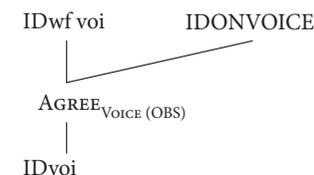
The ranking in (16) can also account for examples where voicing contrasts are maintained before sonorant consonants, as can be seen in (17).

- (17) IDONVOICE » AGREE_{VOICE(OBS)} » IDvoi
Input /mud^hrib/ “on strike”

	IDONVOICE	AGREE _{VOICE(OBS)}	IDvoi
a. mut ^h rib			*!
☞ b. mud ^h rib			

In this section, I have worked out the analysis of regressive assimilation in CA. Satisfaction of the agreement constraint compels a voiced coda to devoice to agree with a following voiceless obstruent, and [voice] spreads from a voiced onset to a preceding voiceless coda. Two positional faithfulness constraints, IDONVOICE (Lombardi 1996), and IDwfoice (Petrova et.al 2006), are responsible for assimilation being regressive. The ranking of the constraints that have come into play thus far is represented in (18).

- (18) Final Ranking of Constraints



4. The unique behavior of gutturals

Any analysis of assimilation in Arabic is not complete without examining the behavior of the group of sounds known as gutturals. These include the pharyngeals /s/ and /ħ/ which are produced “in the middle of the throat”, the uvulars /x/ and /ɣ/ produced in the pharyngeal cavity region nearest to the tongue, and the laryngeals /h/ and /ʔ/ produced “at the back of the throat” (McCarthy 1991:65). In regard to major class features, gutturals are generally characterized as [+son] in the literature on Arabic linguistics (e.g. Frisch et. al. 2004). Therefore, we would expect gutturals not to participate in obstruent voicing assimilation, as either triggers or targets of assimilation.

Abu Mansour (1996) examined voicing assimilation and neutralization in four dialects of Arabic: Daragözü (an Arabic dialect spoken in Turkey), Makkan Arabic, Maltese Arabic, and Sudanese Arabic. Her findings showed that in both Daragözü and Maltese Arabic the gutturals behave like obstruents, with the exception of the sound /ħ/, which did not become voiced in the appropriate environment. As far as Sudanese is concerned, Abu Mansour (1996) observes that the pharyngeals are the only sounds that are not affected by neutralization and voicing assimilation but the rest behave as obstruents. With regard to Makkan Arabic, Abu Mansour (1996) maintains that “the whole class of gutturals behaves like sonorants in syllable-codas” (Abu Mansour 1996:227). Thus, dialects may differ in terms of whether specific guttural consonants pattern with obstruents or with sonorants. In this section, I examine the behavior of CA gutturals with respect to regressive assimilation to determine whether these sounds participate in this phonological process.

4.1 Laryngeals

According to the set of data I have collected on Cairene Arabic, the laryngeals /ʔ/ and /h/ behave as sonorants (i.e. they neither undergo regressive devoicing nor

spread voice in the right environments). In (19), the laryngeals remain voiceless although they are followed by voiced obstruents. In the examples in (20), the laryngeals are preceded by voiced obstruents which do not undergo devoicing.

(19) *Voiceless laryngeal preceding voiced obstruent*

- a. ʔah**h**bal ʔah**h**bal “naïve”
- b. jih**h**gur jih**h**gur “deserts”
- c. ma**z**bara ma**z**bara “grave yard”
- d. jir**z**dar jir**z**dar ‘he’s able’

(20) *Voiceless laryngeal following voiced obstruent*

- a. maz**h**ar maz**h**ar “appearance”
- b. mag**h**uul mag**h**uul “unknown”
- c. ma**h**uur ma**h**uur “fascinated with”
- d. jib**z**a jib**z**a “remains”
- e. fag**z**a fag**z**a “suddenly”

4.2 Uvulars

The class of uvulars, on the other hand, behaves as obstruents; /y/ devoices in coda position when the following consonant is voiceless, as demonstrated by the examples in (21) and in onset position, it spreads voice to a preceding voiceless obstruent, as in (22). /X/ triggers devoicing in a preceding voiced obstruent, as evident from the examples in (23), and undergoes voicing as in (24).

(21) *Voiced uvular followed by voiceless obstruent*

- a. ʔiy**t**isʔaab ʔix**t**isʔaab “rape”
- b. may**s**uul max**s**uul “washed”

(22) *Voiced uvular preceded by a voiceless obstruent*

- a. maf**y**uul maz**y**uul “busy”
- b. ʔas**y**ar ʔaz**y**ar “younger”
- c. jib**y**arrab jid**y**arrab “to be in a foreign country”

(23) *Voiceless uvular preceded by a voiced obstruent*

- a. mad**x**ana mat**x**ana “chimney”
- b. tad**x**iin tat**x**iin “smoking”

(24) *Voiceless uvular followed by voiced obstruent*

- a. ʔax**d**ar ʔay**d**ar “green”
- b. ʔax**a**ar ʔay**a**ar “news”

4.3 Pharyngeals

As we have seen from the examples given above, laryngeal consonants behave like sonorants, failing to participate in voicing assimilation. The same can be said

for the pharyngeal /ʕ/, which does not devoice before voiceless obstruent (25) or spread voice to a preceding voiceless obstruent (26).

(25) *Voiced pharyngeal preceding voiceless obstruent*

- a. maʕ**s**ʔara maʕ**s**ʔara “juicer”
- b. muʕ**t**ʔaal muʕ**t**ʔaal “prison”

(26) *Voiced pharyngeal following voiceless obstruent*

- a. miʕ**t**ʔallim miʕ**t**ʔallim “educated”
- b. maʕ**t**ʔam maʕ**t**ʔam “restaurant”

In contrast, the behavior of the voiceless pharyngeal /ħ/ is quite interesting. This sound can occur before a voiced obstruent, suggesting that it is a sonorant and therefore not subject to the constraint requiring adjacent obstruents to agree in voicing.

(27) *Voiceless pharyngeal preceding voiced obstruent*

- a. jih**d**ʔar jih**d**ʔar “attends”
- b. jih**z**ar jih**z**ar “to be cautious”
- c. ʔah**b**aab ʔah**b**aab “loved ones”

However, when the voiceless pharyngeal follows a voiced obstruent, it causes the obstruent to devoice:

(28) *Voiceless pharyngeal following voiced obstruent*

- a. maz**h**uum ma**sh**uum “crowded”
- b. mid**h**at mi**th**at “Medhat” (proper name)
- c. sʔub**h** sʔup**h** “morning”
- d. big**h**a bik**h**a “rude (f)”

To summarize, the pharyngeal /ʕ/ and the laryngeals /h/ and /ʔ/ behave as sonorants; they do not participate in assimilation by either devoicing or spreading voice. Second, the uvulars /x/ and /y/ behave as obstruents, i.e. they devoice and spread voice in the appropriate environments. Third, the pharyngeal /ħ/ does not undergo voicing in coda position but it triggers devoicing in a preceding voiced obstruent.

In analyzing the CA gutturals, I assume the following. First, the laryngeals are [+son], while the uvulars are [-son]. Therefore, the agreement constraint applies to the uvulars only. Thus the same constraints that are used in the analysis of obstruents and their ranking apply to uvulars also. Note that the constraints can be applied to laryngeals and the pharyngeal /ʕ/ except for the fact that these sounds are not subject to the AGREE constraint. This leaves /ħ/ unaccounted for. The paradoxical behavior of this pharyngeal makes it a problem for the analysis. Therefore, further research is needed. A possible area that one needs to look into is the articulatory properties of this voiceless pharyngeal.

In this section, I have provided an analysis of gutturals, with respect to regressive voicing assimilation. Based on the behavior of gutturals in CA, I have dealt with the pharyngeal and the laryngeals [ʕ, h, and ʔ] as sonorants – they do not participate in either regressive devoicing or spreading voice such that they are not subject to the agreement constraint. The pharyngeal [ħ] behaves as an obstruent by inducing voicelessness in a preceding voiced obstruent. The uvulars [x and ɣ] participate in both regressive devoicing and regressive voicing assimilation due to the fact that they are subject to the agreement constraint.

5. Conclusion

In this paper, I have provided an analysis of CA facts of regressive voicing assimilation in OT. The analysis has shown that CA has both word-internal and word-final regressive assimilation. This process results in obstruents that agree in voicing. The direction of assimilation is always regressive. This is warranted by the high ranking of two positional faithfulness constraints, Lombardi's (1996) IDONVOICE, and Petrova's et.al constraint IDwfoi. The chief finding is that CA licenses a voicing contrast prevocally and at the end of the word but in clusters of obstruents, the first assimilates to the second. The paper also provides additional support for Petrova's et.al (2006) laryngeal faithfulness in word-final position.

As far as guttural sounds are concerned, the major finding is that these sounds fall into two classes: some gutturals, namely, /s/, /z/, and /h/ pattern with sonorant consonants, while other gutturals, namely, /ħ/, /y/ and /x/ participate in voicing assimilation. And finally, the unique behavior of CA pharyngeal /ħ/ which does not become voiced in the right environment is similar to that of Maltese and Daragözü Arabic studied in Abu Mansour (1996). This lends evidence to the uniqueness of /ħ/; however, further research is needed to provide insight into the articulatory properties of this sound that might help in explaining its behavior.

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The phonology–syntax interface:

Phrasal syncope in Makkan Arabic*

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In this article I investigate the proper domain of the application of phrasal syncope in Makkan Arabic using Selkirk's Edge-Based theory of the syntax–phonology interface as well as McCarthy and Prince's theories of Correspondence and Generalized Alignment. I show that both word-level and phrasal syncope result from the interaction of the same syllable structure constraints. The alignment of the right edge of the prosodic constituent (the phonological phrase) with the right edge of a maximal projection in syntactic structure accounts conspicuously for the under-application of phrasal syncope. The present analysis captures significant generalizations about syncope. It demonstrates that the domain of phrasal syncope is internal to the phonological phrase with the plausible consequence of substituting the traditional reference to right-hand and left-hand syncope with the application versus under-application of the process. In addition, it provides evidence that Makkan Arabic is among the languages that exhibit right-edge effects.

1. Introduction

The deletion of short high unstressed vowels from open syllables is a well documented process that characterizes most varieties of Arabic. However, the deletion of such vowels on the phrase level is a less studied case. In the few available analyses of Arabic phrasal syncope, a distinction has been traditionally made

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between right-hand and left-hand syncope. These delete short high vowels from the second or first word in syntactic structures, respectively.

This paper has two goals. The first is an exploration of Arabic syncope with a focus on Makkan Arabic, a dialect that has always been described as having very limited sentence phonology. The second goal is an exploration of the phonology–syntax interaction: the extent of this interaction, its nature, and the formal representation it should be given in the grammar. One question that is central to most works in this area is: should phonology have direct access to syntax, or should the relation be restricted in a principled way by having it go through a new level of representation, namely, prosodic structure, that mediates between the two components? This paper lends support to the latter, since phrasal syncope will be viewed as an interface process that brings out the effects of syntax on phonology through this prosodic structure.

The analysis provided in this paper captures significant generalizations about syncope. First, it shows that both word-level and phrasal syncope follow from the interaction of the same constraints. Second, it provides further evidence for the role of Selkirk's Edge-based Theory of the Syntax-Prosody Interface (1995) as well as the role of McCarthy and Prince's Generalized Alignment constraints in characterizing interface processes (1993). Third, it eliminates the need for reference to right-hand and left-hand syncope. Instead, both types, as well as the discrepancy in the so-called left-hand syncope, are shown to be the result of the dominance of the alignment constraints in the grammar of syncope as an interface process.

The paper is organized as follows. Section 2 provides the main facts of word level syncope along with a detailed description of phrasal syncope. Section 3 is an outline of the main theoretical assumptions of Correspondence Theory, the Edge-based Theory, and Generalized Alignment that underline the analysis. In addition, it will define phonological phrases and delimit their scope in Makkan Arabic. Section 4 starts with a brief account of word-level syncope and the constraints and rankings associated with it. The rest of the section focuses on the analysis of phrasal syncope and the role of the Alignment Constraints. Section 5 is a conclusion.

2. Syncope: The facts

2.1 Word-level syncope¹

Deletion of unstressed short vowels from open syllables is a common process in Arabic. In some dialects, for instance, Egyptian (Broselow 1976; Kenstowicz 1980),

1. Syncope in Makkan Arabic is a post-lexical process (Kabrah 2004). However, I will continue to refer to it as word-level syncope in order to differentiate it from phrasal syncope.

Lebanese (Haddad 1983), and Makkan Arabic (Bakalla 1979, Abu-Mansour 1987, 1995, and Kabrah 2004) only high vowels are deleted, while in other dialects deletion affects all short vowels, high as well as low, for instance, Syrian (Cowell 1964; Adra 1999) and Iraqi Arabic (Odden 1978). Cantineau (1939) refers to dialects which restrict deletion to high vowels and those that generalize deletion to all short vowels as “differential” and “non-differential” dialects, respectively.

Makkan Arabic is a differential dialect where deletion targets high vowels only. The process is further restricted so that only the high front vowel *i* deletes on the word level; deletion rarely affects the high back vowel *u* (Bakalla 1979; Kabrah 2004).² Deletion of the high front vowel characterizes the perfect paradigms of CiCiC verbs and other categories mentioned below (Abu-Mansour 2007).

- | | | | | |
|--------|------------|-----------|---------|----------------------|
| (1) a. | /kíbir/ | kí.bir | *kbir | “he grew up” |
| b. | /kíbir-t/ | ki.bírt | *kbirt | “I, you (m) grew up” |
| c. | /kíbir-at/ | kíb.rat | | “she grew up” |
| d. | /kíbir-na/ | ki.bír.na | *kbirna | “we grew up” |
| e. | /kíbir-u/ | kíb.ru | | “they grew up” |

It also affects the imperfect paradigm of Form III verbs, as well as the final vowel of the active participle, CaaCiC. The underlying vowels of these forms syncope even when syncope creates a CVVC syllable in the output.

- | | | | |
|--------|---------------|------------|-----------------|
| (2) a. | /yi-saafir/ | yi.sáa.fir | “he leaves” |
| b. | /yi-saafir-u/ | yi.sáaf.ru | “they leave” |
| c. | /kaatib/ | káa.tib | “male writer” |
| d. | /kaatiba/ | káat.ba | “female writer” |

Syncope is, however, blocked after CC sequences, if it creates a complex onset or a complex coda:

- | | | | | |
|--------|--------------|--------------|-----------|------------------|
| (3) a. | /yidárris/ | yi.dár.ris | *ydarris | “he teaches” |
| b. | /yidárris-u/ | yi.dár.ri.su | *yidarrsu | “they teach” |
| c. | /zák.tu.bu/ | zák.tu.bu | *zák.tu | “I write it (m)” |
| d. | /yís.ri.fu/ | yís.ri.fu | *yís.r.fu | “they know” |

Other cases of the under-application of syncope which will be relevant to the discussion of phrasal syncope include short vowels of disyllabic words and those

2. Apart from the pattern of the broken plural CuCuC and the potential interaction of its back vowel /u/ with syncope, the only other cases of /u/ in final syllable involve the imperfect of verbs that start with a glottal stop. These are virtually restricted to three verbs in the lexicon of Makkan Arabic, /zakal/, /zaxad/, and /zamar/. Syncope does apply in the perfect paradigm of the first two, e.g. /yaakul/ > [yaa.kul] “he eats”, /yaakul-u/ > [yaak.lu] “they eat”, /zaaxud/ > [zaa.xud] “I take”, and /taaxud-i/ > [taax.di] “you (fem.) take”.

that constitute part of the plural template of a certain class of nouns. This last category involves the high back vowel /u/ in the CuCuC plural pattern:

- (4) a. /ʔabu/ ʔá.bu “father”
 b. /kutubu/ kú.tu.bu “his books”

Generally speaking, the data show that high vowels do not occur in open syllables in Makkan Arabic, except when syllable structure conditions and morphological requirements force the preservation of such vowels.

2.2 Phrasal syncope: The problem

In this section I introduce the different environments where syncope in structures longer than the word applies and where it fails to apply. For ease of exposition at this point in the analysis, I will continue to use the terms “right-hand” and “left-hand” in my description of the data.

First, high front vowels syncopate in the structure /..CV#C(i)CV./ (traditionally known as right-hand syncope) whenever the phonological condition for syncope is met, with no apparent relevance of the syntactic relation between the two words to the application of syncope. The following are representative examples:

- (5) a. *katab-u # k(i)taab* V+NP
 wrote-they book
 “They wrote a book.”
 b. *ʔaxad-u # k(u)tub-na* V+NP
 took-they books-our
 “They took our books.”
 c. *ʔab-u # s(u)ʔaad* N+NP
 father-of Suaad
 “Suaad’s father”
 d. *karaasi # k(u)baar* N+AP
 chairs big
 “big chairs”
 e. *saami # s(i)mis-na* NP+VP
 Sami heard-us
 “Sami heard us.”
 f. *ʔadee-t walad-u # k(i)taab* VP+NP+NP
 gave-I son-his book
 “I gave his son a book.”
 g. *ʔawlaad ʔuxt-i # s(u)ʔaar* NP+AP
 sons sister-my little
 “My sister’s kids are little.”

The examples in (5) represent a wide variety of possible syntactic structures, yet syncope consistently applies to the high vowel of the second word in each phrase or sentence.

However, in the structure /..CiC # V./ (traditionally known as left-hand syncope) syncope may or may not apply. The following are examples where high vowels delete from the final syllable of the first word in the phrase or sentence:

- (6) a. *ʔir(i)b # al-mooja* V+NP
 drank the-water
 “He drank the water.”
 b. *kaat(i)b # al-kitaab* N+NP
 writer the-book
 “the writer of the book”
 c. *al-kaat(i)b # as-susuudi* N+AP
 the writer the-Saudi
 “the Saudi male writer”
 d. *ʔih(i)m # inn-u ʔaltʔaan* N+S’
 understood that-he wrong
 “He understood that he was wrong.”
 e. *badlat al-kaat(i)b # aʔʔ-ʔʔadiid* NP+AP
 suit the-writer the- new
 “the suit of the new male writer”

The high back short vowel also deletes in this context as shown by the following. Note that this vowel does not occur in all the syntactic structures displayed in (6).

- (7) a. *ya-ax(u)d # al-kitaab* V+NP
 He-take the-book
 “He takes the book.”
 b. *na-ak(u)l # at-tamur* V+NP
 we-eat the-dates
 “We eat the dates.”
 c. *kut(u)b # aʔmad* N+NP
 books Ahmad
 “Ahmad’s books”

The discrepancy in the behavior of the left-hand syncope lies in the fact that it fails to apply to short high vowels in this same phonological context, i, e./..CiC # V./ . The following examples show that the final consonant of the first word always syllabifies with the following word. However, the short vowel stays in an open syllable and never deletes.

- (8) a. *al-kaatib # a-nt-aħar* NP+VP
 the-writer commit suicide
 “The male writer committed suicide.”
 **alkaat(i)b # antaħar*
- b. *al-muhaasib # amiin* NP+AP
 the-cashier honest
 “The cashier is honest.”
 **almuhaas(i)b # amiin*
- c. *ra-dee-t al-naaċġih # aċġ-ċaajza* V+NP+NP
 gave-I the-successful the-prize
 “I gave the successful one the prize.”
 **radeetalnaaċġ(i)ħ # aċġċaajza*
- d. *ħarabik # aħmad* VP+NP
 hit-you (fem.) Ahmad
 “Ahmad hit you.”
 **ħarab(i)k # aħmad*
- e. *lisib # ams* VP+AdvP
 played yesterday
 “He played yesterday.”
 **lis(i)b # ams*
- f. *fahham al-kaatib # inn-u yalt’aan* V+NP+S’
 made understand the-writer that he wrong
 “He made the writer understand that he was wrong.”
 **fahhamalkaat(i)b # innu yalt’aan*
- g. *badlat al-kaatib # aċġ-ċadiid-a* N+NP+AP
 suit the-writer the-new-fem.
 “the writer’s new suit”
 **badlatalkaat(i)b # alċċadiida*

Since Arabic does not allow onsetless syllables, all the words that occur after the # boundary in the examples in (6), (7), and (8) are pronounced with the epenthetic default consonant [ʔ] in isolation. On the phrase level, however, resyllabification of the coda of the last syllable in the preceding word provides the required onset.

3. Theoretical background

3.1 Optimality Theory and alignment constraints

Optimality Theory (Prince & Smolensky 1993) and its extension, Correspondence Theory (McCarthy & Prince 1995) provide the basic theoretical apparatus for the analysis presented here. In addition, several alignment constraints are shown to be crucial to the characterization of this interface process.

One type of such constraint has already been utilized by Gouskova (2003) and Kabrah (2004), viz, right anchor, to account for the lack of deletion at the right edge of the word. This correspondence constraint carries over to the phrase level.

The other class of constraints that are at the center of the analysis of phrasal syncope includes constraints on alignment of the edges of constituents (Selkirk 1986, Selkirk & Tateishi 1988, McCarthy & Prince 1993 a,b). The basic idea which underlines the alignment of constituent edges is that the relation between syntactic structure and prosodic structure is captured by constraints on the alignment of the two. Such constraints require the right/left edge of a syntactic category to coincide with the right/left edge of a prosodic constituent:

- (9) The Edge-based Theory of the Syntax–Prosody Interface
 (Selkirk 1986, 1995: 444)

Right/Left edge of α = = => edge of β ,
 α is a syntactic category, β is a prosodic category

The significance of the edge-alignment constraints in characterizing the influence of syntactic structure on prosodic structure has been established in the study of a wide variety of languages (Selkirk 1978, 1986, 1989; Nespor & Vogel 1986; Selkirk & Tateishi 1988; Chen 1987; Inkelas & Zec 1991, to name a few).

Selkirk (1995: 456) observes that phonological phrase breaks typically occur at the edges of morpho-syntactic phrases and that the sentence phonology of a variety of languages requires that the Right, or Left, edge of a maximal phrasal projection coincide with the edge of a phonological phrase (PPh). Selkirk expresses these constraints in the generalized alignment format in (10) (Selkirk 1995: 456).

- (10) a. Align (Lex^{max} ; R; PPh, R)
 b. Align (Lex^{max} ; L; PPh, L)

The constraint in (10) states that the right/left edge of any Lex^{max} in a morpho-syntactic structure coincides with the right/left edge of some phonological phrase in prosodic structure. The two constraints, available universally, must be independently ranked, since languages may show either predominantly right edge or left edge effects (Selkirk 1995). Selkirk shows that the constraint requiring alignment of a phonological phrase with the right edge of a maximal projection is highly ranked in English. The Makkan data on syncope will decide the ranking of (10a) with respect to other constraints in the language.

Before discussing the phonological phrase in Makkan Arabic a note on the characterization of the phonology–syntax interface is in order. There are two views concerning this issue.

In the first approach, phonological rules are allowed to have direct access to syntactic information (Kaisse 1985, & Hamid 1984 on Sudanese Arabic). This

view is thought by most phonologists to be too powerful. The other view is the prosodic approach. It posits a new level of representation that restricts the access of phonology to syntactic information in a principled way. In her pioneering work, Selkirk (1986, 1995) provides a hierarchy of the prosodic categories used by any language in organizing its sentences into prosodic structures. This hierarchy is given in (11).

(11)	The Prosodic Hierarchy	(Selkirk 1995:442)
	Utt Utterance	
	IP Intonational Phrase	
	PPh Phonological Phrase	
	PWd Prosodic Word	
	Ft Foot	
	σ Syllable	

Selkirk proposes that among the prosodic categories in (11), only those constituent domains above the level of the foot and below the level of the intonational phrase, i.e. the prosodic word and the phonological phrase, seem to play a role in a theory of the syntax-phonology relation. This relation is defined in terms of the edges of syntactic constituents of designated types. She suggests two parameters with two possible values for each. The first parameter determines which edge of a constituent, right or left, is relevant to a rule. The second parameter specifies the type of the constituents, X^{\max} , X^{head} , as in (12).

- (12) Phonological phrases contain the material between:
- the right or left edge of,
 - X^{\max} or X^{head}
- (Selkirk 1986)

One of the four logical settings of these parameters is Right-edge X^{\max} . Tone Sandhi in Xiamen and vowel shortening in Chi Mwi:ni (Selkirk 1986) are examples of languages with this setting. It will be shown in this paper that phrasal syncope in Makkan Arabic crucially shows the effect of this edge-based constraint. Therefore, the prosodic constituent important to the alignment issue in Makkan Arabic is the phonological phrase, as delimited by (12).

3.2 Phonological phrases in Makkan Arabic

In this section, I show how the application of the end parameter $]X^{\max}$ to diverse surface syntactic structures in Makkan gives the correct characterization of the derived domains, i.e. the phonological phrases for syncope application. The purpose of this illustration is to be able to refer to these phonological phrases in the analysis. Most of these domains are straightforward in terms of Selkirk's definition of phonological phrases, given in (12).

First, consider the PPh's involved in the right-hand syncope. In (13), the X^{\max} -derived domain (phonological phrase) extends to the end of the utterance, since there is no other X^{\max} . Thus, one phonological phrase encompasses the head of X, in this case the verb, and its object complement. The same can be said of (14) which also constitutes one phonological phrase, except that the head here is a noun and its complement is an NP, the two NPS forming a construct state construction.

- (13)
-
- a. *katab-u # k(i)taab*
wrote-they a book "They wrote a book."
- b. [-----] X^{\max}
- c. (PPh)

- (14)
-
- a. *dawa # s(u)saad*
medicine Suaad "Suaad's medicine"
- b. [-----] X^{\max}
- c. (PPh)

The sentence in (15) consists of two maximal projections, each of which coincides with a phonological phrase. Note that the maximal projection associated with the first phonological phrase consists of one word only. In (13) and (14) vowel deletion occurs inside X^{\max} and thus internal to the PPh. In (15), on the other hand, the vowel is at the left edge of the PPh.

- (15)
-
- a. *saami # s(i)miš - na*
Saami heard- us "Sami heard us."
- b. [---] X^{\max} -----] X^{\max}
- c. (PPh) (PPh)

The structures in (16) and (17) represent left-hand syncope and are also straightforward. Each consists of an X^{\max} where the deleted vowel is internal to the PPh. The only difference between the two phrases lies in the type of object complement the verb has, an NP in (16) and a sentential object in (17).

- (16)
-
- a. *fir(i)b # al-mooja*
drank-he the-water “He drank the water.”
- b. [-----]X^{max}
- c. (PPh)

- (17)
-
- a. *fih(i)m # innu valtsaan*
understood-he that wrong-he “He understood he was wrong.”
- b. [-----]X^{max}
- c. (PPh)

The domains in (18) and (19) below are examples of phonological phrasing in cases where the lexical head has two complements, regardless of whether syncope deletes the vowel on the right or that on the left. These examples of phrasing are in line with Selkirk’s findings for Chi Mwi:ni (Selkirk 1986:390). In Chi Mwi:ni, which has the setting] X^{max}, a complement immediately following a lexical head is included in a derived domain with that head, whereas a second complement will never be in the same domain.

- (18)
-
- a. *zadeet walad-u # k(i)taab*
gave-I son-his a book “I gave his son a book.”
- b. [-----]X^{max} [-----]X^{max}
- c. (PPh) (PPh)

- (19)
-
- a. *fahham # al-kaatib # innu valtsaan*
he made understand the-writer that wrong-he
“He made the writer understand that he was wrong.”
- b. [-----]X^{max} [-----]X^{max}
- c. (PPh) (PPh)

Here, I consider the structures in (18) and (19) to be parallel/similar to Selkirk’s examples from Chi Mwi:ni. However, in (18) and (19) the two complements (arguments) are strictly object complements of the head. In both cases the second complement, whether a single *NP*, as in (18), or a sentence, as in (19), is not included in the same PPh with the preceding head.

In the analysis I present below, these phonological phrases represent the prosodic constituent over which the alignment constraints hold.

4. A concise account of word-level syncope

Since the main focus of this paper is phrasal syncope, rather than word-level syncope, I will present a brief discussion of the latter. It will become clear that the constraints that account for word-level syncope, as well as their ranking, also hold true at the phrase level, a fact that makes such an introduction a prerequisite.

The following analysis is based, in most part, on the two most recent studies of word-level syncope in Makkan Arabic, Gouskova (2003) and Kabrah (2004). However, only those constraints relevant to phrasal syncope are included.

Abu-Mansour (1995), Gouskova (2003) and Kabrah (2004) all agree that syncope is the result of the dominance of the constraint that militates against allowing high vowels in open syllables over faithful parsing of the input vowels.

Gouskova’s constraint *NUC/i,u shows that markedness underlines syncope. She offers a unified explanation of syncope and epenthesis in Makkan Arabic. Her explanation centers on the idea that all markedness constraints derive from harmonic scales. She proposes a number of constraints that indicate the most harmonic vowels, in the sense of the vowels’ suitability to occupy syllable nuclei. Her formulation of the relative sonority is based on the following:

- (20) Constraint on the sonority of syllable nuclei (Prince & Smolensky 1993)
*NUC/∂ » *NUC/i,u » *NUC/e,o
Nucleus harmony scale: nuc / a > nuc / e,o > nuc / u,i > nuc / ∂
There is no constraint *NUC/a

Kabrah (2004) adopts Gouskova’s constraint, and proposes splitting it up into *NUC/i and *NUC/u since Makkan Arabic does not delete all high vowels on the word level.

In what follows I show the constraints I adopt from both analyses with some modifications. In Makkan Arabic, syllable structure constraints take precedence over the marked nucleus *i*. In fact, *NUC/i is dominated by a host of other constraints; it dominates only MAX-V.

- (21) *NUC/i » MAX-V,
Input / kaatiba/ “female writer”

/ kaatib-a /	*NUC/i	MAX-V
a. kaat.ba		*
b. kaa.ti.ba	*!	

It is worth mentioning that MAX-V at the post-lexical level is a high ranked constraint that is only dominated by *NUC/i. Therefore, shortening vowels is prohibited at this level (Abu-Mansour 1995; Kabrah 2004).

Complex onsets and codas are not allowed in the language and are avoided even at the expense of having a marked nucleus /i/, as shown in (22) and (23), respectively.

- (22) *COMPLEX » *NUC/i
Input /kibirt/ “I grew up.”

/kibirt /	*COMPLEX	*NUC/i
a. ki.birt		*
b. kbirt	*!	

- (23) *COMPLEX » *NUC/i,
Input /yidarrisu/ “They study.”

/yidarrisu /	*COMPLEX	*NUC/i
a. yi.dar.ri.su		**
b. ydar.ri.su	*!	*
c. yi.darr.su	*!	*

A marked nucleus /u/ is kept in disyllabic words even though no complex structure is involved. The constraint that decides between the candidates is RIGHT-ANCHOR (McCarthy & Prince 1995) applied to Arabic by Gouskova (2003) and Kabrah (2004).

- (24) RIGHT ANCHOR » *NUCu
Input /ʔabu/ “a father”

/ʔabu /	RIGHT ANCHOR	*NUCu
a. ʔa.bu		*
b. ʔab	*!	

Another relevant constraint is TEMPLATE, which militates against the deletion of morphological material. It was originally proposed by Gafos (2003) and used by

Kabrah (2004) to explain the lack of deletion of a high vowel that constitutes part of the plural pattern, as shown in (25).

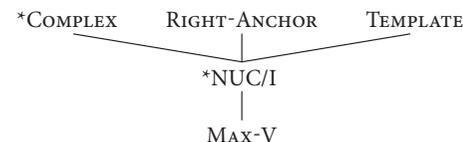
- (25) TEMPLATE, RIGHT-ANCHOR » *NUC/u,
Input /kutubu/ “They wrote.” (Kabrah 2004: 135)

/kutubu /	TEMPLATE	RIGHT ANCHOR	*NUC/u
a. ku.tu.bu			***
b. kut.bu	*!		**
c. ku.tub		*!	**

In (25) both candidates (a) and (b) satisfy RIGHT ANCHOR; however, candidate (a) wins because of satisfaction of the higher ranked constraint, TEMPLATE.

In summary, the full ranking of the constraints relevant to word-level syncope is given in (26).

- (26) Full Constraint Ranking (Word-Level)



4. The role of alignment in phrasal syncope

I now present an analysis of the facts of phrasal syncope. First, I start with cases where vowels syncope regardless of the location of the high vowel, i.e. whether the vowel belongs to the second (cf. (5)) or first word (cf. (6)) in a syntactic structure. The markedness constraints and the syllable structure constraints established for the word-level syncope account for this part of the data as well. This explanation will also cover /u/ deletion in (7). I then show that the lack of deletion of the high vowel from the first word in the structures in (8) is a result of the violation of the alignment constraint that requires the edges in morpho-syntactic structure to coincide with edges in prosodic structure. It will be clear at the end of the analysis that the domain of application for phrasal syncope is designated as inside the phonological phrase.

4.1 Application of syncope

In this section we will see how both right-hand and left-hand syncope are accounted for through the interaction between syllable structure constraints, faithfulness

constraints and a couple of alignment constraints. Whenever syncope fails to apply, it is due to the right edge dominance over the left edge.

I will start my analysis with the data illustrating right-hand syncope. Syncope applies to delete the high vowel from the context $/.CV\#C(i,u)CV./$ in a variety of syntactic structures given in (5). Some of the examples are repeated in (27).

- (27) a. katab-u # k(i)taab V+NP “They wrote a book.”
 b. ʔabu # s(u)ʔaad N+NP “Suaad’s father”
 c. ʔwlaad ʔuxti # s^f(u)ʔaar NP+AP “My sister’s kids are little.”

The relevant constraints that are needed to account for this type of syncope are given in (28–30). The first constraint is the markedness constraint proposed by Gouskova (2003) *NUCi,u, which penalizes candidates with high vowels as syllable nuclei. The second constraint is also a markedness constraint, which prohibits complex margins. In other words, it rules out candidates that have complex onsets or complex codas. The last constraint I introduce here is the faithfulness constraint MAX-V. This constraint requires faithful mapping of vowels. The set of competing candidates is given in tableau (31).

- (28) *NUCi,u (Gouskova 2003, based on Prince & Smolensky 1993)
 The high vowels /i/ and /u/ are prohibited as syllable peaks.
- (29) *COMPLEX (Prince & Smolensky 1993)
 Complex margins are prohibited.
- (30) MAX-IO (V) (McCarthy & Prince 1995)
 No deletion of vowels.
- (31) *COMPLEX » *NUCi,u » MAX-IO (V)
 Input /katabu#kitaab/ “They wrote a book.”

/katabu#kitaab/	*COMPLEX	*NUCi,u	MAX (V)
a. ka.ta.bu.ki.taab		**!	
b. ka.ta.bu.ktaab	*!	*	*
☞ c. ka.ta.buk.taab		*	*
d. ka.tabk.taab	*!		**

In (31), candidate (31a) is eliminated by the markedness constraint *NUCi,u for having two syllables that contain high vowels. Candidate (31b) deletes the high vowel /i/ at the expense of incurring a fatal violation of the markedness constraint *COMPLEX. Candidate (31d) is also ruled out by the same constraint as a result of deleting both high vowels. This allows (31c) to emerge as the winner with a minimal violation of the low ranked constraints.

Our discussion, so far, has not shown the relation between phonology and syntax via the alignment constraint. The constraints that have been discussed are

a well-formedness constraint on syllable structure and a faithfulness constraint. I introduce a new constraint here, which requires faithful mapping of morphemes, expressed in (32).

- (32) MAX-MORPH (based on McCarthy & Prince 1993)
 Morphemes of inputs must be faithfully mapped into their corresponding outputs.
- (33) MAX-MORPH » *NUCi,u » MAX-IO (V)
 Input /katabu#kitaab/ “They wrote a book.”

/katabu#kitaab/	MAX-MORPH	*NUC i,u	MAX-V
a. ka.ta.bu.ki.taab		**!	
b. ka.tab.ki.taab	*!	*	*
☞ c. ka.ta.buk.taab		*	*

The MAX-MORPH constraint dominates the markedness constraint *NUCi,u, as indicated by the winning candidate in (33c). In tableau (33), candidate (33a) is ruled out by the markedness constraint *NUCi,u due to two fatal violations of that constraint. Candidate (33b) deletes its subject morpheme [-u] to avoid having two marks of violation for the markedness constraint, and is thus ruled out. The optimal output (33c) bests its rival (33b) by satisfying the highest faithfulness constraint, rendering it the winner.

At this juncture in the analysis, I introduce the first alignment constraint in (34). This crucial constraint reflects the phonology–syntax interaction. It requires the left edge of a maximal projection to be aligned with the left edge of a phonological phrase. The ranking of this alignment constraint is shown in (35).

- (34) Align (Lex^{max}, L; PPh, L) (Selkirk 1995: 456)
 Align the left edge of a maximal phrasal projection with the left edge of a phonological phrase
- (35) *NUCi,u » ALIGN (L^{max}, L; PPh, L) » MAX-IO (V)
 Input /katabu#kitaab/ “They wrote a book.”

/katabu#kitaab/	*NUCi,u	ALIGN(L)	MAX-IO (V)
a. ka.ta.bu.ki.taab	**!		
☞ b. ka.ta.buk.taab	*	*	*

The competing candidates in (35) differ in the fact that output (35a) obeys the alignment constraint at the expense of incurring a fatal violation of *NUCi,u, for which it has two marks of violation as opposed to one mark for the optimal output.

The fact that the optimal candidate in (35b) violates Align(L) is the first indication that this is a low ranked constraint; it is dominated even by *NUC_{i,u}. Below we see further evidence that at the left edge of constituents alignment is not strictly enforced.

Tableau (36) provides the ranking of all the constraints that have come into play in right-hand syncope.

- (36) *COMPLEX, MAX-MORPH » *NUC_{i,u} » ALIGN-L » MAX-IO (V)
 Input /katabu#kitaab/ ‘They wrote a book.’
 Input /ʔabu#susaad/ ‘Suaad’s father’

/katabu#kitaab/	*COMPLEX	MAX-MORPH	*NUC _{i,u}	ALIGN (L)	MAX-IO (V)
a. ka.ta.bu.ki.taab			**!		
b. ka.tab.ki.taab		*!	*		*
☞ c. ka.ta.buk.taab			*	*	*
d. ka.tabk.taab	*!	*		*	**
e. ka.ta.bu.ktaab	*!		*		*
Input [ʔabu#susaad]					
f. ʔa.bu.su. ʔaad			**!		
g. ʔa.bu.sʔaad	*!		*		*
☞ h. ʔa.bus. ʔaad				*	*

I now move to left-hand syncope where deletion also applies (cf.6). Representative examples are repeated in (37):

- (37) a. fir(i)b # almooja ‘He drank the water.’
 b. badlat alkaat(i) b # aḍḍadiid ‘The suit of the new writer’
 c. fih(i)m #inn-u yaltʔaan ‘He understood that he was wrong.’

The same ranking that we have established for right-hand syncope will also account for the set of data of left-hand syncope. But before showing how these constraints work for the analysis of left-hand syncope, one more constraint ranking needs to be established. This involves the syllable structure well-formedness constraint, given in (38), and the alignment constraint in (34).

- (38) ONSET (Prince & Smolensky 1993)
 All syllables must have onsets.

The ONSET constraint is undominated in Arabic, where all syllables must begin with consonants. The ranking that we need to establish here is between ONSET and the alignment constraint in (34).

- (39) ONSET » ALIGN (Lex^{max}, L; PPh, L)
 Input /firib#almooja/ ‘He drank the water.’

/firib#almooja/	ONSET	ALIGN(L)
a. fi.rib.al.moo.ja	*!	
☞ b. fi.ri.bal.moo.ja		*

As (39) illustrates, the suboptimal output satisfies the alignment constraint but has an onsetless syllable, leading to its elimination. Output (39b) incurs one violation mark for the alignment constraint, but this violation has no effect due to the domination of the alignment constraint by the ONSET constraint.

Tableau (40) gives the ranking of all the constraints that have come to play in left-hand syncope. They are basically the same as those given in (36). The extra undominated constraint here is that of the obligatory ONSET.

- (40) ONSET, *COMPLEX » *NUC_{i,u} » ALIGN (L) » MAX-IO (V)
 Input /firib#almooja/ ‘He drank the water.’
 Input /badlat#alkaatib#aḍḍadiid/ ‘The new writer’s suit’

/firib#almooja/	ONSET	*COMPLEX	*NUC _{i,u}	ALIGN (L)	MAX-IO (V)
a. fi.rib.al.moo.ja	*!		**!		
b. fi.ri.bal.moo.ja			**!	*	
☞ c. fir.bal.moo.ja			*	*	*
Input [badlat#alkaatib aḍḍadiid]					
d. bad.lat.al.kaa. tib.aḍḍadiid	*!*		*		
e. bad.la.tal.kaa. ti.baḍḍadiid			*	*	
☞ f. bad.la.tal.kaat. baḍḍadiid				*	*

Tableau (40) provides further support of the low ranking of Align(L), as evidenced by its violation in the optimal candidates.

4.2 Under-application of syncope

The last set of data I discuss is left-hand syncope where high vowels fail to delete (cf.8). Some examples are repeated in (41).

- (41) a. badlat alkaatib#adʒɔɟadiida “the writer’s new suit”
 b. d^ʕarabik#ahmad “Ahmed hit you (fem.)”
 c. fahham alkaatib # innu yalt^ʕaan “He made the writer understand he was wrong.”

The only constraint I need to introduce here is the alignment constraint which is given in (42). This constraint requires outputs to align the right edge of a maximal projection with the right edge of a phonological phrase (cf.10a).

- (42) Align (Lex^{max}, R; PPh, R) (Selkirk 1995: 456)
 Align the right edge of a maximal projection with the right edge of a phonological phrase.

The first ranking we need to establish is between this new alignment constraint and the constraint responsible for the deletion of high vowels *NUCi,u. Consider tableau (43).

- (43) Align (Lex^{max}, R; PPh, R) » *NUCi,u » MAX-IO (V)
 Input /badlat#alkaatib#aldʒadiida/ “the writer’s new suit”

/badlat alkaatib#adʒɔɟadiida/	ALIGN (R)	*NUCi,u	MAX-IO (V)
a. bad.la.tal.kaa.tib.adʒ.ɟa.dii.da	**!		*
☞ b. bad.la.tal.kaa.ti.baɟ.ɟa.dii.da	*	*	

The alignment constraint dominates the markedness constraint, a ranking that is motivated by the fact that the winning candidate incurs one violation of the alignment constraint. The suboptimal output, on the other hand, has two violations of the same constraint. One mark is incurred through the deletion of the high vowel and the other through resyllabification of *b* as an onset. The optimal output has one violation of the markedness constraint *NUCi,u. Tableau (43) gives evidence of the high ranking of the Align(R) constraint. It dominates both the markedness constraint *NUCi,u and the faithfulness constraint Max-IO(V).

Since the ONSET constraint is undominated in Arabic it is expected to be higher in ranking than the Align(R) constraint as shown in tableau (44).

- (44) ONSET » Align (Lex^{max}, R; PPH, R) » *NUCi,u » MAX-IO (V)
 Input /badlat#alkaatib#aldʒadiida/ “the writer’s new suit”

/badlat alkaatib#adʒɔɟadiida/	ONSET	ALIGN (R)	*NUCi,u	MAX-IO (V)
a. bad.la.tal.kaa.tib.adʒ.ɟa.dii.da	*!		*	
☞ b. bad.la.tal.kaa.ti.baɟ.ɟa.dii.da		*	*	
c. bad.la.tal.kaa.ti.baɟ.ɟa.dii.da		**!		*

Candidate (44a) is excluded by the syllable structure constraint since it lacks an onset. Output (44b) fares better with respect to the alignment constraint for which it has one mark of violation, while candidate (44c) has two violations, resulting in its elimination.

Tableau (45) gives the ranking of all the constraints that are relevant to the account of the underapplication of phrasal syncope.

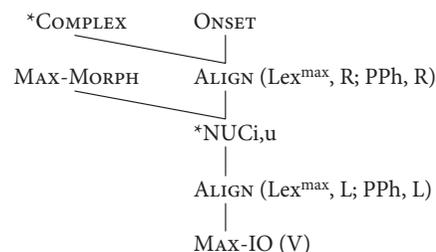
- (45) ONSET » ALIGN (R) » *NUCi,u » ALIGN (L) » MAX-IO (V)
 Input /badlat#alkaatib#aldʒadiida/ “the writer’s new suit”

/badlat alkaatib #adʒɔɟadiida/	ONSET	ALIGN (R)	*NUC i,u	ALIGN (L)	MAX (V)
a. bad.la.tal.kaa.tib.adʒ.ɟa.dii.da	*!		*		
b. bad.la.tal.kaa.ti.baɟ.ɟa.dii.da		**!		*	*
☞ c. bad.la.tal.kaa.ti.baɟ.ɟa.dii.da		*	*	*	
Input [d ^ʕ arabik#ahmad]					
d. d ^ʕ a.ra.bik.aħ.mad	*!		*		
e. d ^ʕ a.rab.kaħ.mad		**!		*	*
☞ f. d ^ʕ a.rabi.kaħ.mad		*	*		

The ranking in tableau (45) is crucial to the status of the two types of alignment constraints, Align (L) given in (34) and Align(R) in (42). It shows that Makkan Arabic is among the languages that exhibit a right edge effect. While Align(R) ranks high in the hierarchy of the constraints that account for syncope, Align(L) is dominated by every other constraint including Align(R).

The final ranking given in (46) illustrates the undominated syllable well-formedness constraints in Makkan Arabic. The right edge effect, along with the morphological constraint MAX-MORPH, is also ranked high. The fact that in Makkan Arabic deletion of high vowels is rather restricted has not been efficiently expressed in previous accounts. This account brings out this fact through constraint interaction and domination.

(46) Phrasal Syncope: Final Ranking



5. Conclusion

The major contribution of the present analysis is that it captures several significant generalizations about phrasal syncope in Makkan Arabic. First, it shows that both word-level and phrasal syncope follow from the interaction of the same constraints. Second, the reference to right-hand and left-hand syncope, as well as the assumed discrepancy in the behavior of the latter, have become not only redundant, but also implausible. It has become clear throughout the analysis that a distinction should be made between application and underapplication of syncope, rather than location of the deleted vowel. Third, the analysis provides further evidence that Makkan Arabic is among the languages that show right edge effects. This result is in line with the fact that while most varieties of Arabic allow processes such as epenthesis, to apply freely at the left edge of constituents, they show restricted phonological activity at the right edge of structures. The phrasal syncope data confirm this in a very conspicuous manner. While the alignment constraints at both edges were called upon in the analysis, only violation of alignment at the right edge proved to be high ranked and thus undominated.

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Leading, linking, and closing tones and tunes in Egyptian Arabic – what a simple intonation system tells us about the nature of intonation

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This paper offers an analysis of the basic structure of the intonation system of Egyptian Arabic within an autosegmental framework. Contrary to mainstream work, it is assumed here that the primary units of intonation are not abstract targets but meaningful configurations. Intonation is thought of as an essentially iconic system. Thus three tonal configurations are identified in line with the metaphorical extensions of Ohala's frequency code and correlated with pragmatic functions: A rising contour is characteristic for topic articulation, while a falling contour, signifying assertion, is used for the focal parts of an utterance. The third, neutral, tone is used for downplaying given material. The contours are obtained by manipulating the basic accent shape, a rise-fall, when associating the melody with the linguistic material. Manipulations are represented as features affecting the low and high targets of the individual accents.

1. Background and goal

The approach taken in this paper is that intonation is essentially a largely iconic language component whose basic meanings can be derived by a very simple mechanism, namely the rising and falling of pitch, yielding a small set of oppositions that fulfil essential communicative functions. Bolinger (1986) notes that:

"intonation is fundamentally the *opposition of up and down*, with meanings clustering around the poles of the opposition in accord with metaphorical extension [...], the system is coherent, to the extent *that most if not all manifestations can be ultimately traced to the primary metaphor* (Bolinger 1986:221f., emphasis mine)

This view on intonation was developed predominantly on the basis of English, a language well known for the complexity of the tones it uses (cf. the richness of the "finite-state grammar" as suggested by Pierrehumbert 1980). If we look at a language such as Egyptian Arabic (EA) which has repeatedly been claimed to

possess an utterly simple intonational structure (Rastegar-El Zarka 1997; Rifaat 2005; Hellmuth 2006), can we expect Bolinger's fundamental insight to become even more evident?

In this paper, I argue that the traditional understanding of intonation that identifies main functional categories and their formal realization is superior to the assumption of an abstract intonational grammar consisting of pitch accents. I follow Bolinger in the view that "the overintellectualization of speech [...] has obscured the true nature of intonation." (Bolinger 1986:202). I also argue that it is the trade-off between prosodic features that is responsible for the prosodic encoding of information structure, one of the most important linguistic functions of prosody. The actual prosodic strategy employed ultimately depends on the speaker's choice. It is, however, possible to identify basic tonal contours that convey certain rather "global" meanings which will be dealt with here.

The paper is organized as follows: Section 2 offers some basic facts of EA intonation. In Section 3, the problems with identifying abstract pitch accents are briefly stated and an alternative approach based on natural preferences of tonal movement and the preferred association of tonal contours with textual units is suggested. Section 4 establishes three intonational categories: leading, linking, and closing configurations and provides the functional justification and applications of these intonational categories in relation to information-structural categories, viz. topic and focus, presenting data from a corpus of EA that consists of spontaneous and semi-spontaneous speech and experimental data.¹ Finally, Section 5 provides an outlook for further research and comments on the question of methodology in the study of prosody and the phonological status of prosodic features.

2. Some basic facts of EA intonation

One of the characteristics of EA prosody is the succession of highs and lows within an intonation contour. This largely differs from the familiar melodies of West-Germanic languages, such as German and English, with their long sequences of accentless syllables that only serve as a link between prominent positions within a contour. Mitchell's sketchy but insightful description of Arabic intonation as "up-and-down" or "see-saw" (Mitchell 1993:222) already points to that fact.

1. Part of the data was collected by Sam Hellmuth for the Project on Information Structure SFB632/D2, University of Potsdam, funded by the DFG, using the questionnaire on information structure QUIS (Skopeteas et al. 2006).

This tendency to accent all words has also been recognized by Rifaat (1991) in his investigation of the neutral declarative sentence in Classical Arabic (Egyptian pronunciation), by Rastegar-El Zarka (1997) in her study of Modern Standard Arabic (MSA; Egyptian pronunciation) and by Hellmuth (2006). In her corpus of EA, there were only 2–4% of unaccented content words (p. 66). These successive accents frequently display a certain downdrift within intonation phrases and even across them.

In EA intonation phrases, the peak of the last accent is frequently downstepped. Downstep has been attributed to the phonetic tendency of final lowering and conveys greater finality or assertion. Final downstep is probably more common in broad focus, early focus conditions, andthetic utterances as opposed to narrow focus on an argument in final position. Figure 1 shows a typical contour of a neutral declarative utterance with downdrift throughout the whole contour and total downstep of the last accent.

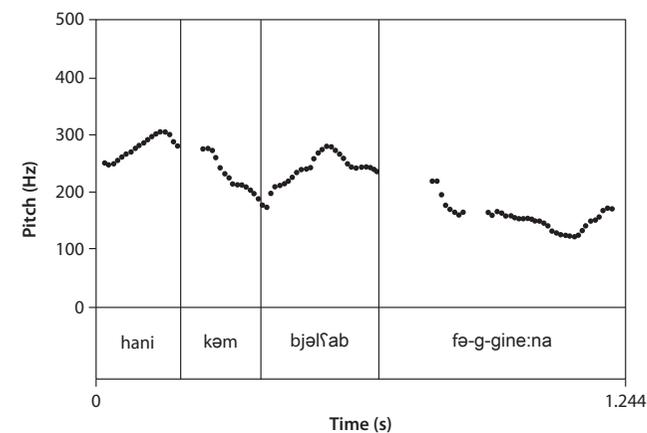


Figure 1. Pitch track of the utterance *haani kaan bijilʕab fi l-gineena* 'Hany was playing in the garden'

3. An alternative representation of EA intonation

In recent studies, the ups and downs exhibited by the above pitch track have commonly been analyzed as pitch accents within an autosegmental metrical (AM) framework (Rifaat 1991, 2005, Rastegar-El Zarka 1997; Hellmuth 2006). In Standard AM Theory (Pierrehumbert 1980, Beckman & Pierrehumbert 1986), these pitch accents can be either left-headed or right-headed, thus the theory

differentiates between H+L*, H*+L, L+H*, and L*+H pitch accents. The important finding by Arvaniti, Ladd and Mennen (1998) that tonal targets are closely aligned with specific segmental landmarks has inspired a great number of alignment studies in different languages (cf. Hellmuth 2006, 2007 & Hellmuth & El Zarka 2007 for EA).

The common basic assumption in Standard AM Theory has been that the exact position and the stability of the alignment of the individual targets constitute the basis for the analysis of a pitch accent as either rising to or from an accented syllable (L+H* and L*+H) or falling to and from an accented syllable (H+L* and H*+L). Thus various analyses of essentially the same contour, e.g. a rising-falling movement, have been ventured by different students of intonation, depending on the theoretical assumptions they embrace (cf. for example the different analyses of Spanish dialects, summarized in Tevis McGory & Díaz-Campos (2002) and the different analyses of the prenuclear pitch accent in Modern Greek (Arvaniti, Ladd & Mennen 2000).

Likewise, the most common pitch accent type of EA, a rise-fall just as in Spanish and Greek, has been analyzed in three different ways: as LH for prenuclear accents vs. HL for nuclear accents (Rifaat 1991), as H*L (Rastegar-El Zarka 1997), as predominantly H for prenuclear accents and HL for nuclear accents (Rifaat 2005), and finally as LH* (Hellmuth 2006). This was at least partly due to differences in the theoretical frameworks applied, but it also raises the question of whether these differences also reflect differences in the data, especially since the three studies investigated three different varieties of Arabic in Egypt, namely Classical Arabic (Rifaat 1991), Modern Standard Arabic (MSA) (Rastegar-El Zarka 1997; Rifaat 2005) and EA (Hellmuth 2006).

Hellmuth (2006, 2007) presents a quantitative study of phonetic alignment of intonational targets in EA pitch accents and comes to the conclusion that the sole pitch accent in EA is a rise LH*, showing that the L is stably aligned with the beginning of the stressed syllable while the position of the H is less reliable. In general, the H seems to be aligned later in Hellmuth's EA data than was observed by Rastegar-El Zarka (1997) in the MSA data as pronounced by Egyptians. In Hellmuth's data, the H is aligned outside a stressed CV-syllable (cf. Figure 2), a fact that has neither been reported by Rastegar-El Zarka (1997) nor by Rifaat (2005). The following schematized graphic representation of alignment in CV-syllables in the different accounts illustrates that point.

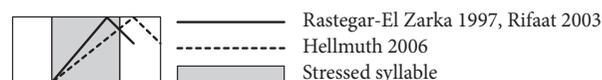


Figure 2. Schematised peak alignment in CV syllables, as observed in prior studies; adapted from Hellmuth & El Zarka (2007)

To find out whether this observed difference was due to register differences, Hellmuth & El Zarka (2007) conducted a small scale experiment that investigated a parallel corpus of MSA and EA sentences. The results of the experiment suggest that the differences are speaker-dependent and probably due to speech style, but not to the different registers involved. It seems that an early alignment of the high peak is correlated with a more deliberate and careful pronunciation of either MSA or EA materials. Interestingly, the occurrence of another low target between a peak and the onset of the next accented syllable creating a flat low stretch between two successive accents was observed in this experimental data (cf. also Figure 6). This can be explained by the fact that the inter-accentual interval was designed to cover four to six syllables in order to avoid tonal repulsion from an upcoming tonal event.

There are various reasons to reject the analyses suggested so far. Firstly, the occurrence of two successive L-tones has to be accounted for, and an analysis involving a bi-tonal accent, whether it is a fall HL or a rise LH, does not provide descriptive adequacy. If the late alignment is to be taken as the basis for identifying the accent as a rise LH, it would be necessary to invoke the existence of a low boundary tone to account for the actually observed contour, a rather ad-hoc stipulation, at least in those cases where there are no other phonetic boundary cues present. The second more general reason not to analyze the tonal contours in question as either a rise or a fall when the tonal contour is perceptually ambiguous is the arbitrariness of this decision, as the data do not seem to be uniform. In the following subsection, it will be demonstrated that there are contours that are clearly rising and others that are clearly falling, but there is also something in between. In the remainder of the paper, I will refer to the basic pitch configurations as accents, suggesting that they could be analyzed as tritonal pitch accents (Grice 1995) or as accentual phrases as, e.g. in Japanese (Beckman & Pierrehumbert 1986). Such accents are frequently characterized by a high peak flanked by two low tones, one immediately preceding the H, roughly at the beginning of the stressed syllable, thus constituting a rise across that syllable whose main function seems to be creating prominence by highlighting the stressed syllable in a word. The position of the second L is highly variable, but given that there is enough segmental material available between the H and the beginning of the next accented word, it will often seek the beginning of this lexical item and/or the end of the first one serving a delimiting function. The existence (or non-existence) and position of that L seems to carry an ostensibly higher functional load than the first L, participating in signalling focus position (Rastegar-El Zarka 1997) or at least influencing the degree of cohesion or separateness between two successive accents (cf. Bolinger 1986).

The tonal units are assigned to semantic textual units, not to phonologically defined constituents like syllables or feet. The association of the peak (or in rare cases the valley) with a stressed syllable can be viewed as the default case. Given

the phonetic shape of the accent as outlined above, we might venture an analysis of the smallest intonational unit in EA along the following lines: The default pattern of the accent is LHL (cf. Figure 3), brought about by the preference of maximal tonal contrast, following a general Gestalt principle of “figure against ground”. This tonal shape can be modified in certain ways. The first L-tone of a closing accent may be missing at the beginning of an intonation phrase as an instance of truncation when there is not enough segmental material available. If it is present in such cases, this will add to the salience of the accented item. The second L-tone of a rising accent will normally not be present or merged with the first L of the following accent, if there is not enough syllabic material available for its realization. To account for this observation I adopt Gussenhoven’s (1983) “tone-linking rule”.

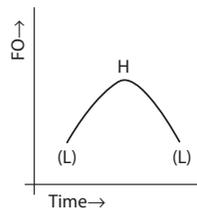


Figure 3. Schematized basic accent type of EA intonation

In addition, the position of the individual tonal targets can be moved along the vertical and horizontal axes as illustrated in Figure 4. This can be represented by the use of features such as [delayed] or [early], noted here as ‘T[>]’ and ‘T[<]’ or [upstep] and [downstep], noted here as ‘T[↑]’ and ‘T[↓]’ to represent the relative height of the tones or of the tunes with respect to each other. Another feature is [tonal spreading], represented as ‘T⁻’ to represent suspended pitch contours. Such contours frequently, but not exclusively, occur at the end of an intonation unit to signal continuation. A similar idea is expressed in Rifaat (2005). Rifaat’s default H accent is described as a rising-falling gesture which can be modified by intonational features. In his account the falling and rising accents (HL, LH) are derived by leftward or rightward movement on the horizontal axis, while his L accent is derived by vertical movement. Rifaat’s modifications thus only seem to affect the alignment and scaling of the peak. A further difference to this account is his assumption that falling and rising accents only occur phrase- or tune-finally. It is thus possible to view them as involving boundary phenomena while the suggestion made here assumes the conceptual separation between tonal phenomena and phrasing and a direct semantic effect on tonal contours without recourse to the rhythmic component.

Furthermore, the contrast between figure and ground may be minimized resulting in a flat contour with only a very small excursion or even complete absence of the H-tone. These compressed accents are used for downtoning the informationally given lexical material they are associated with. Phonological features were originally introduced into AM Theory by Ladd (1983) and independently by Gussenhoven (1983). As pointed out by Ladd, they provide a powerful means for cross-classification of certain contour types and functional generalizations without abandoning the possibility of expressing phonetic detail (Ladd 1983: 721).

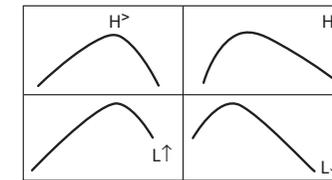


Figure 4. Some logically possible phonetic shapes of the accent in EA represented by features

One intonation phrase consists of one or more accents. When these are concatenated, unaccented function words are usually attached to the left accent and integrated in the fall. Concatenated accents may exhibit loose or tight cohesion (cf. Gussenhoven’s tone linking), depending on the position of the second L tone. If the final L is associated with the boundary of the content word, this enhances separation between two successive items (cf. the examples in Figure 6 that exhibit more separateness of the individual accents when compared to the one in Figure 1). The above outlined possibilities of phonetic modifications of the basic accent shape can be used to express functional differences. This question will be dealt with in the next section after the fundamental contours have been identified on the basis of the iconic functions of pitch.

4. Tones and tunes and the iconic meaning of intonation

In the remainder of this paper I will present data from EA that provide evidence for a very simple analysis based on essentially three different tonal contours. Two of them stand in opposition to each other, whereas the third contour is more of a neutral tone that does not carry any meaning, but functions simply as a link between the meaningful units.

The basic claim is that EA intonation can be ultimately reduced to leading, closing and linking configurations that are functionally conditioned. Their phonetic expression can be derived from a biological code, namely the frequency

code (Ohala 1983; Gussenhoven 2002). This natural code, as conceived by Ohala, is innate in humans and non-humans alike and derives from the simple fact that high pitch is associated with smaller sized creatures and low pitch with larger sized ones, based on the size of the larynx and the resulting height of the voice pitch. The fact that large and strong creatures by virtue of their size are conceived as threatening and small creatures as non-threatening has given rise to a number of secondary meanings of high and low frequencies, both paralinguistic and linguistic. Thus high pitch is associated with friendliness, uncertainty and incredulity, which can be conventionalized to express modal and informational (or discursual) meanings like questioning, opening a topic, and continuation. Low pitch, on the other hand, conveys authoritative notions like power, decisiveness and certainty, which can be fossilized in the linguistic expression of assertion and finality (cf. Gussenhoven 2002).

A second code, as proposed by Gussenhoven (2002), is the effort code. It rests on the assumption that to get a message across, a speaker will raise his/her effort level. The manifestation of stronger effort is more salience or prominence. Such prominence can either result in higher overall pitch range or in wider pitch excursion on individual items. Gussenhoven only deals with tone, but the notion can be extended to include intensity and duration increase as well. The effort code is relevant to the articulation of focus, especially narrow focus. If a focussed item is not in sentence final position, it is frequently marked in opposition to the surrounding accents by a wider pitch range (cf. also Norlin 1989).

4.1 Leading versus closing tonal contours

The ideas expressed here are by no means new. Navarro Tomás (1974 [1944]), in his account of Spanish intonation, already divides his ‘frase enunciativa’ into two parts: one that builds up tension, ‘rama tensiva’ or ‘anticadencia’, and a second one that relieves the tension, the ‘rama distensiva’ or ‘cadencia’. Brazil (1975, 1997) proposes two main tonal contours that are primarily used to express discursual meanings, described as referring (fall-rise and rise) and proclaiming (fall and rise-fall). These meanings are tied to a pragmatic distinction that Brazil (1997: 68f.) describes as the opposition of “what we are talking about” and what has been “freshly introduced into the conversation”, thus hinting at the opposition of given vs. new on the one hand and topic vs. focus on the other. Gussenhoven (1983) in his treatment of English intonation essentially adopts this approach, distinguishing between ‘selection’ for the first meaning and ‘addition’ for the latter. The same is true for Bolinger’s profile B and A. Bolinger identifies the difference between B and A along the dimension of connectedness-separateness (Bolinger 1986: 166) and attributes to B a sense of predictability and incompleteness and a lack of assertiveness and separate pointing (p. 177).

EA intonation contours show that these basic notions are pervasive in the language. Following the ideas outlined above, it is possible to identify rising contours that carry the functions of opening a discourse or leading to a climax, or offering the turn to an interlocutor, and closing contours that terminate a discourse unit or part of it and convey a sense of finality. Leading tones are thus associated with linguistic material that poses a question or a problem or identifies a starting point; hence they represent the proper intonation for questions and topics, but it may also signal continuation and connectedness in accordance with Bolinger’s ideas. Closing contours are associated with assertions and express finality and separateness, thus characterizing focal constituents.

The following example (Figure 5) from a narrative (Abdel Massih 1975: 269f.) exhibits a leading and a closing tune associated with a topic-comment sentence. The rise is realized across two accents with the second one upstepped in relation to the first. The closing contour is realized by three successive downdrifting accents over the comment part of the sentence.

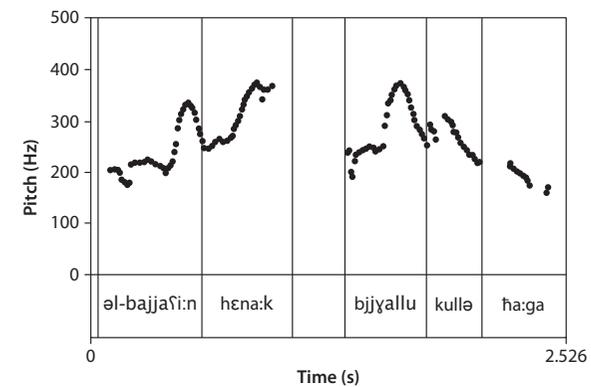


Figure 5. $_{TOP}$ [il-bajjaʕi:n hinaak] $_{TOP}$ $_{FOC}$ [bijyallu kull ʔa:ga] $_{FOC}$ ‘the vendors there make everything expensive’

It is commonly accepted that whole tunes carry a specific meaning, while individual pitch accents are supposed to be abstract phonological units. But in fact, the distinction between tune and tone (i.e. accent) is difficult to draw. Following Bolinger and others, I therefore hold the view that what I have called accent here and which is largely equivalent to Bolinger’s profile may itself carry the intended meaning. In Figure 6 we see how the individual accents of the subject constituent *il-misza bitaasit kamaal* ‘Kamal’s goat’ under topic and focus conditions exhibit the characteristics of a leading tune in one tone. Therefore, it does not seem appropriate to resort to an accent-boundary tone analysis for the characterization of a

tune. Such an analysis fails to account for the generalization present in both tonal shapes. The distinct prosodic encodings are of course not realized by the behaviour of the tones alone, but also involve other features, such as intensity and durational features resulting in perceivable boundaries (e.g. after *kamaal* in 6b), but one main correlate of the focal tone is the early and low realization of the L-tone at the boundary of the lexical items.

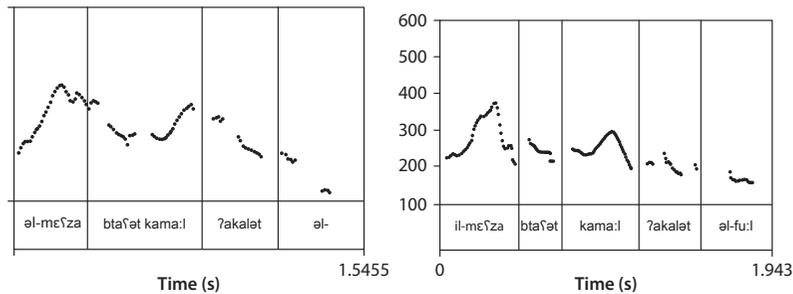


Figure 6. *il-misza bitaasit kamaal* 'Kamal's goat' as a topic expression (panel 6a) and as a focus expression (panel 6b)

The leading contour associated with a topic demonstrably serves as a starting point for the information to be delivered. Scene-setting frames constitute another type of starting point that has frequently been regarded as a type of topic (Chafe 1976). The pitch track in Figure 7 depicts a left-dislocated frame, typically associated with a leading tone.

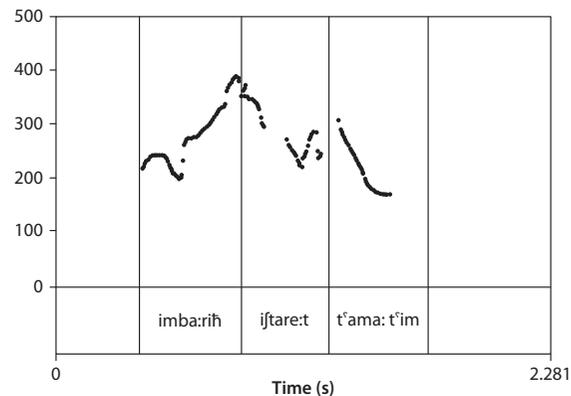


Figure 7. FRAME[imbarih]FRAME[iftareet t'amaat'im] 'Yesterday, I bought tomatoes'

In all-new sentences where the whole utterance is in focus when answering a question such as 'what happened?' or 'what do you see?' the tones may be of a closing nature, just as in the above illustrated narrow focus case (Figure 6b). In the following utterance (Figure 8), the existential construction that bears the main functional load in signalling sentence focus is supported by a sequence of closing tones.

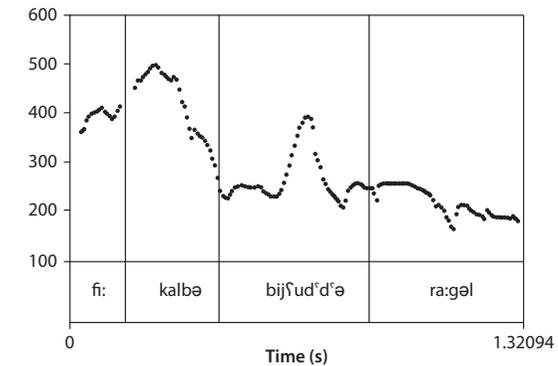


Figure 8. *fi kalb bijʕud d' raagil* 'There is a dog biting a man'

4.2 Leading versus linking tones

The third tonal contour that I claim to be a link between meaningful units is characterized by a flat or virtually flat contour that is used for downtoning or backgrounding the textual materials it is associated with. It is similar to deaccenting, which is held to be the most common realization for given information (Cruttenden 2006). But it may exhibit a slight rise (and fall) instead of being completely flat as is the case in English deaccented material. Accordingly, there is often some ambiguity between real deaccenting and readily perceptible accents that are not or almost not made prominent by tonal obtrusion, but rather by duration or intensity (cf. Kohler's 1991 duration accents). The underlying theoretical stance here is the conceptual separation between accent as prominence and accent as tone, namely to acknowledge that there may be accents that are not marked by tonal events. In any case, this contour diminishes the prominence of the textual items in comparison to the surrounding accents with wider excursions. This has also been observed by Chahal (2001) for Lebanese. Figure 9 shows pitch tracks of two structurally identical sentences with a focussed adjunct phrase. The sentence on the left shows a linking tone at the beginning with very low prominence on the verb introducing the topical constituent 'Maryam' with a linking tone. The

sentence on the right assigns more weight to the verbal constituent and makes it prominent by a fully-fledged accent.

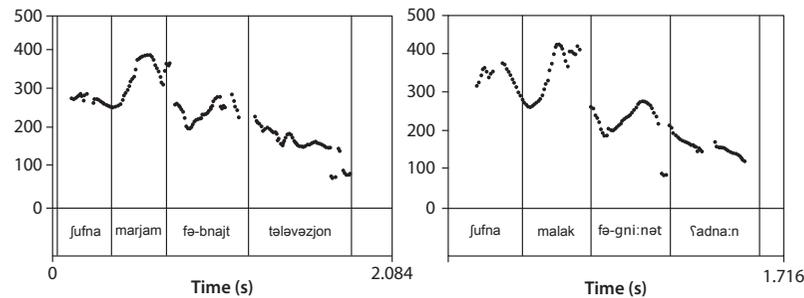


Figure 9. *fufna marjam fi binaajit it-tilivizjoon* 'We saw Maryam in the television building' and *fufna malak fi giniinit sadnaan* 'We saw Malak in Adnan's garden' with Maryam and Malak as topics

4.3 The phonetic realization of leading and closing tones

As outlined in Section 3, there are prosodic features that may be varied to bring about a modification of the accent in order to match the intended meanings. I will concentrate here only on tonal features, neglecting for the time being intensity and duration which might be of no less importance than the intonational ones.

The one feature I am going to discuss here is the alignment of the individual target points of the accent as identified in Section 3. In the following, I will present some quantitative data from a controlled production experiment with three speakers that shall give some preliminary evidence for the suggested analysis. As I have repeatedly pointed out, linguistic functions of the perceptually defined holistic categories rely on the interplay of several phonetic features. If we look only at one of them, e.g. alignment, we are probably ignoring other important features. It will therefore not be claimed that any features create phonological categories on their own. But it can be shown that alignment is at least one correlate of the categorical units identified.

It has been observed in a number of languages that peak alignment tends to be earlier under focus condition. The distinction has in fact been claimed to be categorical in some languages and interpreted as involving two different pitch accents (e.g. Frota 2000 for Portuguese, Face 2001 for Spanish). The EA data also show a remarkable difference in peak alignment, at least with some speakers. In the above experiment designed to test different phonetic cues in

focus vs. non-focus or topic conditions, I found that all three speakers tended to align the peak earlier under focus, but the results were highly significant for only one speaker across all different syllable shapes of the tested target words. This suggests that peak alignment is but one strategy to signal focus and is highly speaker-dependent.

The main hypothesized cue to the closing tone is the fall realized within the semantic unit the accent is associated with. I have assumed that the right flanking L-tone will tend to be aligned with the word boundary or in cases of special emphasis even earlier at the end of the stressed syllable (Rastegar-El Zarka 1997), whereas the fall continues into the following meaningful item under topic condition. As an effect, the topical item is on the whole perceived as predominantly rising. This was tested by calculating the difference between the f0 value at the peak and the f0 value at the following boundary of the target word, both in topic and focus conditions. The significance of the results was checked by a one way ANOVA. The results turned out to be highly significant for two speakers (speaker M0: $F(1,76) = 34,66$, $p < .0000001$; speaker F0: $F(1,96) = 16,49$, $p < .0001$) and are graphically displayed in Figure 10.

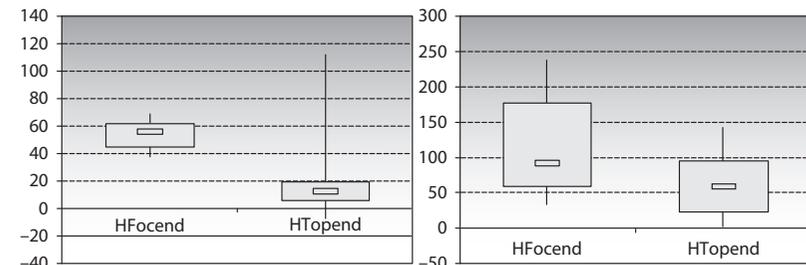


Figure 10. Median and interquartile values of the difference between the f0 value at the peak (H) and the f0 value at the end of the target word for speaker M0 (10a) and speaker F0 (10b); f0 values measured in Hz

Figure 11 shows an example of a topical (11a) and a focal (11b) target word. The figure not only shows the significantly lower pitch at the end of the focussed word, it also illustrates the later peak alignment in the topic constituent and the longer duration of the focussed item.

The tentative linguistic interpretation of these results is that the variable peak alignment might only be a derived feature of rising vs. falling tones, while the contribution of valley alignment is more significant and could be the primary phonological feature (cf. Figure 6). This would be in line with the observations made in

Rastegar-El Zarka (1997), who also suggests that in emphatic articulation of focal accents the L is even aligned with the end of the stressed syllable. The present data also contain such cases, but more research is needed to support or falsify these hypotheses and to test the contribution and phonological status of other prosodic features as well.

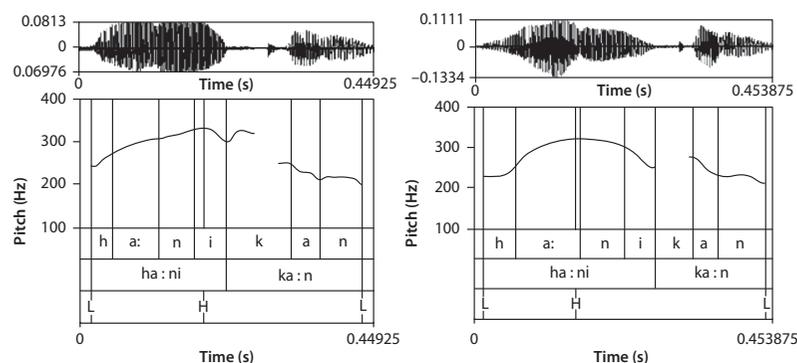


Figure 11. *haani* as a topic (11a) and as a focus (11b) in *haani kaan bijilsab fi l-gineena* ‘Hany was playing in the garden’

In closing, some words regarding the above mentioned in-between cases are called for. Frequently, a tonal contour can neither be identified as unambiguously leading or closing. There is ample evidence that in a number of languages, e.g. Spanish, Dutch, English, Greek, Japanese, and Mandarin Chinese, L-tones of pre-nuclear accents are located at the beginning of the stressed syllable, while the H is mostly aligned around the end of that syllable or even later (cf. Ladd 2004). EA is no exception in that respect, as has been convincingly shown by Hellmuth (2006). It seems therefore justified to identify something similar to a default neutral case of the accentual unit in which the first L is always located at the beginning of an accented syllable and, all else being equal, the rise more often than not continues until the end of that syllable or a little further. In the default accent, the fall happens slowly and automatically without any effort, whereas a focal accent will be characterized by an abrupt fall that is willingly induced and demands more effort on the part of the speaker. This may also result in earlier alignment of the H to provide the time for the falling gesture to be carried out. If neither a focal nor a topical accent is chosen by the speaker, the accentual gesture will be something in between. As most experiments are carried out using detached reading of so-called neutral declaratives, the results of these studies mostly rely on such ‘neutral’ prenuclear (i.e. non-last, non-focal and non-topical) accents and thus

more or less describe the neutral accent shape.² If this assumption is correct, the ‘default prenuclear’ accent can be viewed as the prominent version of the linking tone described above.

5. Summary, conclusion and outlook

In this paper, I have tried to show how the simple intonation system of EA reflects the iconic nature and simple mechanisms of intonation. I have suggested that EA intonation can ultimately be reduced to three tonal types, identified predominantly on a perceptual basis and established as functional categories by correlating these tonal contours with basic information-structural constituents. It has been further suggested that the tonal contours rely on the iconic principle of the frequency code.

The theoretical position defended here is basically a holistic approach that views intonational units as unitary contours that might even be meaningful themselves. This is in contradiction with the tenets of Standard AM theory that views pitch contours as a concatenation of atomistic pitch events by splitting up functionally relevant contours into pitch accents, phrase and boundary tones. Methodologically, the approach taken in this paper entails a top-down analysis that, based on functional categories, identifies holistic configurations and then looks into their phonetic realization. Nevertheless, the fundamental idea of tune-text-association that distinguishes between a metrical and a tonal component for prosody and a textual component is adopted from the autosegmental-metrical approach, and so is the notational convention of labelling L and H target tones for its various virtues. Besides its convenience and simplicity, it seems that, in conjunction with the suggested features, this notation provides a powerful system of achieving descriptive adequacy and the basis for cross-classification as a prerequisite for typological comparison. Even if it is not individual targets, but gestures that are taken as intonational primes, their description in terms of endpoints allows for quantitative investigation.

It must be emphasized that our current knowledge about the intonation of Arabic in general, and EA in particular, is still very scanty when compared, for example, to well-studied European languages. It is therefore premature to establish an elaborate phonological system for EA prosody – a fact that was also

2. A methodological caveat, however, has to be taken into account in quantitative studies. If a speaker has to repeat the same sentences time and again, he/she is very likely to impose different information structures for the sake of variation.

stated by Rifaat (2005) –, particularly as the functional categories are far from being clear. The interplay of paralinguistic and linguistic meanings as well as their fuzziness and the gradience of tonal and prominence variation make it extremely difficult to identify categorical prosodic units and discrete prosodic features, a prerequisite for phonological classification. So we must await further research including well-designed production and perception experiments as well as qualitative and quantitative work on spontaneous data before we will perhaps be able to establish all features that are relevant to the prosodic encoding of communicative functions in EA and to make decisions as to their phonological status. In the meantime we might be well advised to keep in mind Dwight Bolinger's words: "In the gradient world of intonation, everything that is detectable is potentially significant." (1986: 225)

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PART II

Morphology & syntax

2nd proofs

Arabic agree, silent pronouns, and reciprocals

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Various grammatical phenomena have been analyzed so far as essentially *formal*, or interfacing with PF syntax. Verb subject agreement asymmetries, subject pronoun deficiency (or 'Pro drop'), and morpho-syntactic variation in reciprocal expressions in Arabic have been treated as such. The article investigates how important properties of these phenomena can be more successfully treated in a fine-grained semantic syntax. The analysis is based on the semantic interpretability of features (typically Number), found in Agree configurations, in line with Minimalist approaches.

Key words: agreement asymmetry; Arabic Agree; collective; distributive; EPP; expletive; generic; impersonal; morphological reciprocal; passive; pluractional; plural of plural; pro drop; pronoun deficiency; semantic number; symmetric event; syntactic reciprocal; verbal number

Within the generative tradition, the analysis of a number of Arabic grammatical phenomena often lacks substantial *semantically interfaced* (LF/Sem) syntax, compared to *formally interfaced* (PF/Phon) syntax. But although the importance of Sem syntax (in addition to information/discourse structure) is not disputed among Arabist scholars, the practice of Arabic linguistics has often privileged, until now, the formal aspects (in the intended sense), at the expense of significant meaning ingredients.

In this address, I investigate three phenomena which have been treated so far as essentially formal: (a) Arabic verb subject agreement asymmetries, (c) subject pronoun deficiency (or 'Pro drop'), and (c) variation in reciprocal expressions. I then show how they can be more successfully treated in a fine-grained Sem syntax. First, Sem syntax of Number and Classifier on nouns and verbs and their (extended) projections is needed to adequately state and explain significant Agree asymmetries. Second, Person specification and its 'topicality' is behind the behavior of 'referential' Pro, and the correlated 'passive' behavior of 'arbitrary' Pro in consistently null subject languages (= NSL) like Arabic. Third, morphological and

syntactic reciprocals exhibit various semantic differences, typically in terms of distributivity and discontinuity, which can be hardly treated in the absence of precise correlations at the semantics/syntax interface. The current analysis is based on the semantic interpretability of the features involved, as well as the properties of Agree configurations in which they are found, in line with the Minimalist view found in Chomsky (1995, 2000, 2008).

I became seriously interested in plurality of verbs since 1994, when I tried to argue that some verb forms behave as compositionally plural verbs, while others do not (see e.g. Fassi Fehri 2000, 2003). It also happened that I had a stimulating discussion with Chomsky in 1996, about whether a plural feature on a verb can be interpretable or not. My interest in reciprocals goes back to my 1986 book, where I gave a first description of the differences between morphological and syntactic reciprocals. My renewed interest in so-called Pro drop owes much to Chomsky's minimalist views, and typically to Holmberg's (2005, 2007) analysis of Pro in terms of feature interpretability in so-called consistent NSL like Arabic, compared to partial NSL like Finnish or Hebrew.

1. Verb subject agree asymmetries and semantic number

The literature on agreement asymmetries in VS and SV clauses is huge, and it is impossible to give a fair and exhaustive list of contributors here. Pro incorporation aside, this literature is dominated by a formal view, which takes the plural [-uu] that you see on the verb in (1) as a mere agreement (formal) marker:¹

1. A significant number of references is provided in Harbert & Bahloul (2002), and Bahloul (2007). Competing analyses involve:
 - i. a generalized Spec-Head agreement, through expletive VSO (championed by Mohammed (2000); see also Fassi Fehri (1988c)), or through 'agreement loss' (Aoun, Benmamoun & Sportiche (1994));
 - ii. Spec-Head and Head-Comp alternations ('rich' and 'poor' agreement; Fassi Fehri (1993), Harbert & Bahloul (2002), Bahloul (2007));
 - iii. Head-Comp agreement vs Pro incorporation, or identification (Fassi Fehri (1993), Soltan (2006)).
 - iv. Pronominal and non-pronominal agreement (Harbert & Bahloul (2002), Fassi Fehri (1988a)).

Features involved in discussions include Gender and Number (but hardly Person; see Ferguson (1989); and Belnap & Shabaneh (1992) for non-human). Benmamoun (2000), in particular, defends the PF view.

- (1) *r-rīzaalu zaaʔ-uu*
the-men came-pl
"The men came".

The plural marker is denied the status of a *pronominal argument* (as in the incorporation view I discuss in Part II), or that of a *semantic pluralizer* of the verb, as I will explore here. Since there are various manifestations of semantic plurality on both nouns and verbs (or their projections), I will devote the two sections of part I to examine nominal and verbal pluralities, and to address the *where* and the *how* questions. Interpretability of Agree features (in probe goal relations) distributed over np or vp, architecture of Number (Nb) varieties (or Classifier; Cl), and semantics of Number are important ingredients used in Fassi Fehri's (2009) treatment, which is basically replicated here.

1.1 Nominal number

It is often stated in traditional and orientalist literature that there are three kinds of nominal Number: singular, dual, and plural (see e.g. Wright 1974; Hasan 1971). This ternary system is exemplified by the following patterns:

- (2) mudarris 'teacher'; mudarris-aa-(n) 'teacher-dual'; mudarris-uu(n) 'teacher-pl'
"a teacher"; "two teachers"; "teachers"
- (3) a. raʒul 'man'; raʒul-aa(n) 'man-dual'; riʒaal 'men'
"a man"; "two men"; "men"
- b. kaatib 'writer'; kaatib-aa(n) 'writer-dual'; kuttaab 'writers'
"a writer"; "two writers"; "writers"

But observe that only the dual is systematically 'sound', in the sense that it is formed from the singular by the concatenative vowel lengthening [-aa], while the concatenative [uu], as in (2), is rarely found as a normal plural of nouns (although it can be with adjectives). Thus concatenative **raʒul-uun* and **kaatib-uun* are unattested nominal plurals. It is rather the (non-concatenative) broken plural which constitutes the essential manifestation of nominal plurality, not the sound form (note that the broken plural is also productive with adjectives).

1.1.1 Where is number?

In the case of pairs such as *raʒul/riʒaal* 'man/men', *kalb/kilaab* 'dog/dogs', vowel lengthening can be associated with a plural structure and interpretation.² Various

2. See McCarthy and Prince (1990) for arguments that the plural stem is derived from from the singular stem via additional morphology.

syntactic tests can also be used to assess plurality on the noun: plural verbal agreement as in (1) above, repeated as (1'), manifestation of plural in numeral constructions as in (4a), or in measure constructions as in (5):

(1') *r-rīḡaalu ʒaaʔ-uu (*ʒaaʔ-a)*
the-men came-pl (came-sing)
“The men came”.

(4) a. *ʒarbaʒat-u riḡaal-in*
four-NOM men-GEN
“four men”

b. *ʒalf-u raḡul-in*
thousand-NOM man-GEN
“a thousand men”

(5) a. *niṣf-u r-rīḡaal-i ḥadʔar-uu*
half-NOM the-men-GEN came-pl
“A half of the men were present”.

b. *niṣf-u r-rīḡaal-i ḥadʔar-a*
half-NOM the-men-GEN came-sing
“A half of the men was present”.

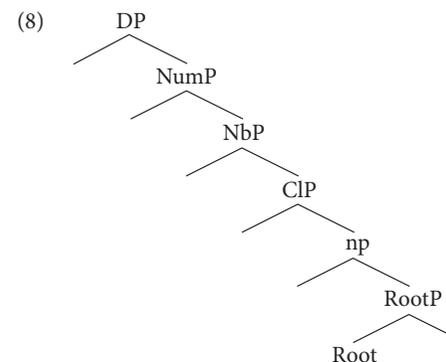
In the Numeral phrase (= NumP), Pl is on the noun in (4a), but not (4b). Likewise, in the measure construction, Nb is on the measure noun in (5b), but not (5a). In the case of coordination, there are different numbers on each internal np, and a different number on the whole DP:

(6) *hind-un wa-bakr-un ʒaaʔ-aa*
Hind-NOM and-Bakr-NOM came-dual
“Hind and Bakr came”.

In the nominal architecture then, Number is mobile, and occurs at different positions, on n, Nb, Num, or DP. To complete the picture, note that Number can be located on the root/stem. For example, a noun unit formed by a Classifier (= Cl) like [-ii] can have a plural form as its input:

(7) a. *ʒasraab-ii ʔbedouin.arab.pl-Cl; ʒanbaar-ii ʔzanbaar.pl-Cl*
“a bedouin Arab”; “an Anbari”
b. *barbar-ii ʔberber.Cl; “a Berber”*

In this case, the plural is part of nominal root, to which which a Cl attaches, or it is completely lexicalized (see Fassi Fehri 2004 for detail). Thus the interpretation of the nominal phrase depends on where Plural is located. The following architecture provides the essential structure needed, and the Pl can be attached to any category here:



This answers the *where* question. A for the *how*, we have to wait for the following subsections, to see how Pl is attached or manifested either as a feature or a category, or as a head or a modifier, etc.

1.1.2 Non-human plurality

In (3) above, the plural masculine agreement marker [-uu] on the verb matches a human subject. When the subject is non-human, plural agreement takes another form, a feminine singular:

(9) *kilaab-un nabaḥa-t (*nabaḥ-uu)*
dogs-NOM barked-f
“Some dogs barked”.

It is rather misleading, obviously, to think of this marker as being truly singular in terms of semantics, as can be shown by various plurality tests (including reciprocity; see below, Section 3), or feminine, since *kilaab* is plural of *kalb*, which is clearly masculine. Hence feminine singular is just an approximation in terms of form, not content (see Fassi Fehri (1988a) for a precursory treatment)).

1.1.3 Lexical collectives

The feminine singular marker on the verb occurs with collective nouns, which suggests that it can be seen as a form of *collective agreement*. In fact, collectives vary as to whether they are associated with this form of agreement: (a) obligatorily, (b) optionally, or (c) whether they are incompatible with it:³

3. The following abbreviations are used: f for feminine, m for masculine, sg for singular, ind for indicative.

- (10) *l-xajl-u t-asrif-u rukbaan-a-haa (*j-asrif-u)*
the-horse-NOM 3F-know-IND riders-ACC-her (*3m-know-IND)
“Horses know their riders”.
- (11) a. *n-naħl-u t'aara-t*
the-bee flew-F
“Bees flew”.
- b. *n-naħl-u t'aara*
The-bee flew
“Bees flew”.
- (12) *l-fariiq-u ʒtamaʒa (*ʒtamaʒa-t)*
the-committee met
“The committee met”.

In these collectives, one might distinguish kinds from groups: *fariiq* ‘team’ is a masculine group, but *laʒnah* ‘committee’ is a feminine group. Kind names like *naml* ‘ants’, *baqar* ‘cows’ are ambiguous, etc. (see Fassi Fehri 2004).⁴ In a significant number of cases, the feminine/masculine distinction appears to be conventional/formal rather than semantic, and not all lexically collective nouns trigger feminine singular agreement, although it is potentially semantically motivated. These differences in agreement of collectives are then lexical (or properties of roots), and the masculine/feminine distinction appears to be one of gender, rather than of collective plurality.⁵

More importantly, however, is the fact that at least some of these collectives enter syntactic configurations in which they can control two distinct forms of agreement, associated with distinct semantics. For example, collective nouns control agreement alternations: (a) a human plural agreement in the form of a plural masculine, and (b) a collective agreement in the form of feminine singular:

- (13) a. *n-naas-u t-us'allii li-rabb-i-haa*
the-people-NOM 3F-pray for-god-GEN-her
“People pray for their God”.

4. Compare with group names like *xajl* ‘horses’ or *ʒibil* ‘camels’ which are rather feminine.

5. This is in fact just an approximation. It is presumably the case that some collectives are lexically marked for a collective ‘gender’, whereas others are not. Collective marking appears to be strikingly distinct from gender. For example, *faras* ‘she-horse’ is traditionally only feminine, and its masculine counterpart is *his'aan* ‘he-horse’, thus instantiating a sex-based gender distinction, although *faras* is used recently as masculine as well. See Roman (1990) for an excellent survey, as well as discussion of gender/collective confusions. See also Wright (1974) and Hachimi (2007) for Arabic gender intricacies.

- b. *n-naas-u j-us'all-uu-na li-rabb-i-him*
the-people-nom 3-pray-PL-IND for-god-gen-their
“People pray for their God”.

Such alternations suggest that *naas*, the controller of agreement, has in fact no inherent lexical specification for Number or Gender, since it is feminine in one case and masculine in another, or plural in one case and singular in another. Other collective nouns like *ʒarab* ‘arabs’, *barbar* ‘berbers’, *suruub-ijj-at* ‘bedouin arabs’, *fusuub-ijj-at* ‘non-Arab moslem nationalists’, *nas'araar-aa* ‘christians’, etc. behave in the same way, although their form cannot be strictly taken to be a plural form, derived from a singular through some additional plural morphology. Moreover, these lexical collectives do behave like syntactic collectives in significant ways, as described in the next subsection.⁶

1.1.4 Syntactic collectives

I call syntactic collectives broken plural DPs which are interpreted collectively (as collections or groups). They differ from lexical collectives in that their interpretation is not based on any lexical collective ingredient, but rather on their plural form. Like lexical collectives, their plurality is manifested through agreement alternations, associated either with normal plurality, or collective plurality:

- (14) a. *l-falaasifat-u t-aquul-u haaḍaa*
the-philosophers 3F-say-IND this
“Philosophers (as a group) say this”.
- b. *l-falaasifat-u j-aquul-uu-na haaḍaa*
the-philosophers 3-say-PL-IND this
“Philosophers say this”.
- (from Fassi Fehri (1988a))

In (14a), *al-falaasif-at* reads as a collective, or a group, and the verb is marked with the collective agreement marker [-t]. In (14b), on the other hand, this DP reads as a normal plural, and the verb is marked with the masculine plural. Clearly, the singular *fajlasuuf* is masculine, and it does not make sense to say that its plural becomes feminine. More importantly, the two readings cannot be distinguished on the bases of any internal properties of broken plurals. Rather, it must be that their syntax is different.

As a first approximation, let us assume that both collective and non-collective plurals are dominated by Nb in (8), and that the two plural types are in

6. In fact, *fusuub-ijj-at* is formed from the plural *fusuub* ‘peoples’, the individual affix [ijj], and a sum-unit (or group) affix [-at], which forms the collective. *naas* has been claimed to be a non-canonical plural of *ʒnsaan* by the tradition, but its plurality cannot be derivationally established.

complementary distribution (under Nb). But other properties lead us to think that the two plurals do not occupy the same position. For example, collective agreement is not sensitive to VS/SV order alternations, but the non-collective is. The following pair of VS sentences are the counterparts of the SV sentences in (14). The collective agreement is invariantly feminine singular, but the normal agreement is variant (it appears here in the masculine singular form):

- (15) a. *t-aquul-u l-falaasifat-u haaḍaa*
 3f-say the-philosophers this
 “Philosophers (as a group) say this”.
 b. *j-aquul-u l-falaasifat-u haaḍaa (*j-aquul-uu-na)*
 3-say-IND the-philosophers this
 “Philosophers say this”.

In (15b), the [uu] Pl is excluded. Since the generalization on asymmetric Agreement appears to be simpler if it is stated in terms of absence of the Number projection, then the collective is better treated as a Classifier, rather than Number. Cl agreement is then not sensitive to VS/SV orders in the relevant respect.⁷

If collective is placed under Cl, then two possibilities arise: Cl is higher than NbP if *falaasifat* is under NbP (and hence acts as an external Cl), or Cl is over np, and plural is attached to the root of n. But there is reason to think that Cl, and even Pl may be higher, i.e. in DP:⁸

7. Zabbal (2002) provides similar alternations but construe them as essentially morpho-semantic, depending on the broken/sound plural interpretations. Clearly, morphology proper plays a minor role in this system, which depends essentially on syntax (see e.g. the behavior of *naas*, which has no morphology). Likewise, it is not the case that the collective/distributive interpretations (crucially) depend only on the broken/sound distinction, since the sound system is rather marginal for (masculine) nouns. Similar observations can be made with regard to alternations supported by various kind names, such as *qawm* ‘people, folk, nation’, *rakb* ‘riders’, etc. See Fassi Fehri (2009) for more detail, as well as examples of sound plurals that allow collective agreement.

8. The starred agreement in parentheses is infelicitous in normal contexts. But in (18) below, the plural masculine is possible if horses are ‘personized’. For example, in the Coranic text (XXVI, 18), when *naml* is treated as an addressee, it becomes possible to use a plural masculine imperative form:

- (i) *qaala-t naml-at-un jaa rajj-u-haa n-naml-u*
 said-F ant-unit-NOM oh the-ant-NOM
dxul-uu masaakin-a-kum
 enter-PL lodgings-ACC-your
 An ant said: Oh ants, reintegrate your lodgings!

- (16) *l-xajl-u wa-l-kilaab-u saada-t*
 the-horses and-the-dogs came.back-F
 “The horses and the dogs came back”.
 (17) *l-xajl-u wa-r-riḡaal-u ṡaad-uu (*ṡaada-t)*
 the-horses and-the-men came.back-PL(M)
 “The horses and the dogs came back”.
 (18) *l-xajl-u ṡaada-t (*ṡaad-uu)*
 the-horses came.back-F
 “The horses came back”.

What these contrasts show is that a conjoined DP can control a collective agreement, suggesting that the Nb here is DP Number. In (17), the conjoined DP is human, by resolution, although one member is non-human. In (18), the DP is non-human, and the normal plural is ill-formed. These patterns can be accounted for only if the relevant Nb is on the (maximal) DP, rather than on its members, which have their own NbP. This is sketched in the representation (19), for the DP in (17):

- (19)
- ```

 graph TD
 DP1[DP [+pl, +m]] --- DP2[DP [+f, +sg]]
 DP1 --- ConjP[ConjP]
 DP2 --- l_xajl[l-xajl- u]
 ConjP --- wa[wa]
 ConjP --- DP3[DP [+pl, +m]]
 DP3 --- r_riḡaal[r-riḡaal- u]

```

Note that the resolution is in ‘favour’ of the human DP. But in any case, the conjoined DP has different number and gender values from what results from a union of the feature values of its members.

Further variation in Number is instantiated by the following constructions:

- (20) *n-naml-u j-askunu l-baraarij-a wa-l-xaraabaat-i*  
 the-ant-NOM 3-inhabit the-deserts-ACC and-the-ruins-ACC  
 “Ants inhabit deserts and ruins”.  
 (21) *qaala-t n-naml-u li-baṡd<sup>f</sup>-i-haa baṡd<sup>f</sup>-un*  
 said-F the-ant-NOM to-some-gen-her some-NOM  
*dxul-uu masaakin-akum*  
 enter-PL lodgings-ACC-your  
 “The ants said to each other: enter your lodgings!”  
 (22) *qaala-t l-ṡaṡraab-u ṡaaman-naa*  
 said-F the-bedouin.Arab believed-we  
 “The Bedouin Arabs (as a group) said they became faithful”.

In (20) and (21), *naml*, a kind name, varies as to whether it behaves as a singular masculine or feminine, with respect to verbal agreement, or as a plural masculine (in the imperative). Likewise, it varies depending on whether it controls a feminine bound anaphor, or a plural masculine pronominal. In (22), the subject agreement is feminine singular with the first verb, and masculine plural with the second verb. Clearly, such a variation cannot be lexically handled by any property of the subject DP. In the next subsection, I deal with double plurals, duals of plurals, plurals of abundance, etc. the treatment of which provides additional motivation for the fine-grained picture of plurality I have elaborated.

### 1.1.5 Plural of plural and similar matters

As shown in Fassi Fehri (2003, 2005) and Fassi Fehri & Vinet (2007), various plurals can re-pluralize:

- (23) a. *qawl* → *zaqwaal* → *zaqawiil* “saying; sayings; many sayings”  
 b. *farq* → *furuuq* → *furuuq-aat* “difference; differences; a lot of differences”  
 c. *raʒul* → *riʒaal* → *riʒaal-aat* “man; men; collections of men”

The new formed plurals, however, is not *stricto sensu* ‘a plural of a plural’ in the sense that a new sum is formed from discrete sums taken as atomic entities, more like what happens e.g. with groups. In other words, it is not be a ‘multiplier sum’ Pl, or a double star Pl (\*\*). It is rather interpreted as (a) a ‘taxonomic plural’, i.e. a plural that pluralizes sorts or kinds, or (b) an ‘intensive plural’, in the sense that it increases the amount or quantity of the entities involved. Thus *zaqawiil* in (23a) has rather one of the two following interpretations:

- (24) a. “many-many sayings; a lot of sayings” (intensive)  
 b. “sorts-of-sayings” (taxonomic)  
 Note that these meanings are found when kinds or masses are pluralized:

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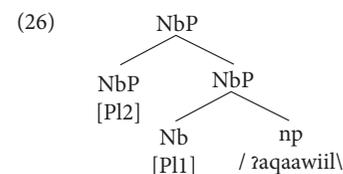
- (25) a. *xajl* → *xujuul* “horses; a lot of horses, kinds of horses”  
 b. *samak* → *ʒasmaak* “fish; a lot of fish, kinds of fish”  
 c. *tamr* → *tumuur* “dates; a lot of dates, kinds of dates”

The plural of the kind may mean either (a) different sorts/kinds of ‘horses’, i.e. the taxonomic reading, or (b) many-many ‘dates’, ‘fish’, i.e. the intensive/abundant quantity reading. Likewise, mass nouns like *maaʔ* ‘water’, *ʒaθaaθ* ‘furniture’ can be pluralized. When they do, they do not behave like a multiplier/sum plural, but rather like an intensive or taxonomic plural. Thus *mijaah* ‘waters’ can mean either ‘a lot of water’ (intensive), or ‘many sorts of water’ (taxonomic).

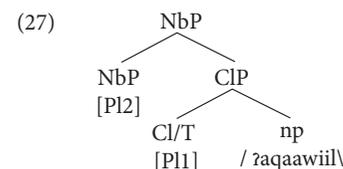
In sum, the ‘plural of the plural’ behaves like the plural of kind or mass. Kind and mass are non-atomic entities, i.e. [∅ atomic]. The plural of these entities

is different from the plural of individuals or groups, which are. [+atomic]. The inflectional plural of the latter, being a sum, forms a [-atomic] entity, as in e.g. Link (1983). But the plural of plural, or the plural of kind or mass, is basically non-singular or non-atomic, as I put it, rather than a [-atomic] plural. Let us now see in more concrete terms how these ‘plural of plural’, ‘second plural’, plurals of masses, etc. can be syntactically represented.

In its intensive reading, I take *zaqawiil* to have two numbers, which are generated under Nb: one Nb acts as a pluralizing head (meaning basically ‘not-one’ or ‘many’; = P11), and a second Nb is an adjoined modifier, which contributes the intensive (or big quantity) reading (= P12) as follows:



In its taxonomic reading, I take *zaqawiil* to be headed by a taxonomic classifier Cl/T, which is pluralized via a Nb head, as in the following:



In the two structures, the two plural forms are assumed to be part of syntax, fulfilling the positions and the functions indicated, building on ideas by Krifka (1995), Borer (2005), and Wiltshko (2008), among others (see Fassi Fehri (2009) for more detail). The syntactic status of taxonomic plural in (27) is then made parallel to that of the ‘dual of the plural’ found in Classical Arabic (Astaraadii, II, 177–179, Wright, I, 190).<sup>9, 10</sup>

9. Contrary to the ‘plural of the plural’, the ‘dual of the plural’ has only one reading, namely the taxonomic or sorting out reading, as in the following examples:

- i. *riʒaal-aan* ‘men-dual’; “two collections/kinds of men”  
 ii. *ʒimaal-aan* ‘camels-dual’; “two collections/kinds of camels”

It roughly means ‘two sorts/kinds/collections of men, camels’. See Ojeda (1992) for more detail.

10. For the Cl status of plural (in e.g. English), see Borer (2005), and the references cited there, as well as Doetjes (2008).

In sum, plurality arises at various levels of structure in the grammar and lexicon. A clear illustration was provided by collective plurality, which exhibits distinct properties at RootP, np, NbP, NumP, or DP levels. Second, double Plural/Nb manifestations and readings have been sorted out, depending on whether Pl is a head under Cl or under Nb, or an adjunct modifier.<sup>11</sup>

### 1.3 Verb plurality

Verbs can be born as plural. An activity like *raqas<sup>s</sup>a* ‘dance’ can denote a plurality of dancing events (in addition to a singular). It can be conceived as a counterpart of a nominal kind. Plurality can be assessed in various ways. For example, one can measure the number of times that the event occurred, as in (28), or the number of cognate event units, as in (29):<sup>12</sup>

(28) *raqas<sup>s</sup>a r-ri3aal-u θalaaθ-a marr-aat-in*  
danced the-men three times  
“The men danced three times”.

(29) *raqas<sup>s</sup>a r-ri3al-u θalaaθ-a raqas<sup>s</sup>-aat-in*  
danced the-men three dance-unit.pl-GEN  
“The men danced three dances”.

Sentences like (30) and (31) also support the view that the event denoted by the verb is plural:

(30) *raqas<sup>s</sup>a r-ri3al-u 3akqara min raqs<sup>s</sup>-at-in*  
danced the-men more than dance-unit-GEN  
“The men danced more than one dance”.

(31) *r-raqs<sup>s</sup>-u kanaa 3ajj-id-an*  
the-dancing-NOM was good-ACC  
“The dancing was good”.

The first sentence put a lower bound on dancing by using a cognate unit event, and the second sentence uses a kind event nominal to refer to the several event units,

11. I leave aside here many questions of execution or description. For example, I did not discuss when Pl counts as a feature or a category, although it should be easily transparent. Second, the important point made is not the non-existence of ‘plural of plural’, but rather that such existence should be mediated by Cl. See Zabbal (2002) for relevant discussion of interpretive issues, as well as Roman (1990) and Hachimi (2007).

12. This section is based on Fassi Fehri (2009).

involved in (more than one) dancing. Repetitive and cumulative readings of (30) and (31) are then expected. Likewise, collective and cumulative readings of the event are involved in (32):

(32) *raqas<sup>s</sup>a 3arbasat-u ri3aal-in θalaaθ-a raqas<sup>s</sup>-aat-in*  
danced four men three dances  
“Four men danced three dances”.

In fact, the three event units of dancing may have been performed collectively, or distributively, by one to four men, and in each dance, 1 to 4 men may have participated. What matters is that the sum of dances is 3, and the sum of participants in all dances is neither more nor less than 4. The numbers are then reached repetitively or cumulatively. I assume that predicates such as these are lexically cumulative, the lexical root being the source of collective, repetitive, or cumulative meanings. Following Kratzer (2008), I also assume that as far as grammar goes, no distinction is made between distributive, cumulative, collective, or iterative interpretations. These predicates fall under Krifka’s (1992) cumulative universal, which states that ‘simple predicates in natural language typically are cumulative’.

Kratzer (2008) further argues that verbs have the characteristic property of taking arguments, and there are transitive and unaccusative verbs which are inherently relational (*relate, connect, resemble, surpass, outdo, depend, hinder, cause, etc.*). It is essential that these verbs characterize kinds of eventualities by relating them to (at least one of) their participants. If denotations of verbs and thematic role predicates are cumulative from the start, the effortless availability of a cumulative interpretation for sentences like (32) above is expected. It is then reasonable to think that verbs, like nouns, have (as roots) an interpretation of a kind, or general number, which induces plural (and singular) interpretations (as argued e.g. in Fassi Fehri (2005), Rullman & You (2006), Fassi Fehri (2009)); see also Corbett (2000) for general number).

#### 1.3.1 Pluractional morphology

In Arabic, productive morphology of pluractionality involves consonant germination, (partial) reduplication, or vowel lengthening. These internal morphologies apply to basic roots, to form complex roots, and they induce various pluractional interpretations, including so-called repetitive/intensive, ‘interaction/participation’, or ‘attenuative’ readings (see Fassi Fehri (2000, 2003) for varieties of these meanings):

(33) *3awwal-a r-ra3ul-u*  
walked.intens the-man-NOM  
“The man took a lot of walks”.

- (34) *ʒaadaba r-raʒul-u l-marʒat-a*  
 pulled.PL the man-NOM the-woman-ACC  
 “The man shared pulling with the woman”.

- (35) a. *xanna* “to speak through the nose; nasalize”  
 b. *xanxana* “to nasalize smoothly and repeatedly”

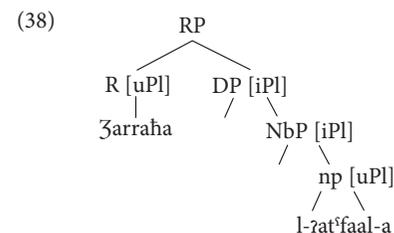
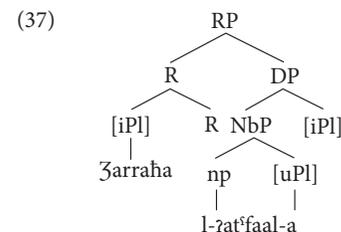
Consider the transitive intensive found in the following construction:

- (36) *ʒarraha l-ʒundijj-u l-ʒatʔfaal-a*  
 wounded.intens the-soldier-NOM the-children-ACC  
 a. “The soldier inflicted many wounds to the children”.  
 b. “The soldier wounded many children”.

Such a construction is ambiguous. The consonant gemination (a form of reduplication) tells us (a) how repetitive is the suffering of the children from the event of wounding, whereby many wounds are inflicted to the children (call it the *event* reading, termed usually the intensive), or (b) it tells us how high is the quantity of children who were wounded, whereby many of the children were wounded (call it the *participant* reading). Suppose we translate ‘many’ (a big quantity) by Pl, and that Pl in each case is interpreted as ‘abundant’ Pl, a sort of double plural. In the event reading, Pl pluralizes the already lexically plural event. In the participant (object) reading, the noun is already Pl, and the gemination induces a secondary pluralization, from which the ‘abundance’, or increase in quantity of the already plural noun can be induced. Let us take the second pluralization to affect the DP level in such a case (in line with Sauerland’s (2003) and Kratzer’s (2008) DP pluralization). Clearly, the Pl on the DP cannot be np internally interpreted, since np is already pluralized (by NbP). Note in passing that the two readings are available just in case the object is plural, but not when it is singular.

Suppose we use Agree to account for the two readings. In the event reading, the morphological Pl is interpreted on the (verbal) root head, and the intensive event reading may result from adjoining Pl to the root, as (an adverb-like) modifier. Modifying an already plural root by a Pl gives the effect of plural intensification. The object DP is irrelevant for the interpretation in this case. In the object/participant reading, on the other hand, Pl is not interpretable on the root. Since the second pluralization is reflected on the object DP, rather than the event itself, I will assume that Pl is an uninterpretable feature on the head root, and it is interpretable on the DP. DP is now endowed with two Pl heads, one on the np, which is internally interpreted, and one on the DP, which is interpreted only externally, or more precisely, values the Pl uninterpretable feature on the root (verbal) head. The Pl on the head root then acts as an agreement marker with regard to the upper Pl on the DP. But the second plural is interpreted on the DP, although its marking

is on the verb. The DP plural, which undergoes a second (semantic) pluralization, has either the taxonomic or the massive/intensive reading, as explained above. I tentatively provide the following (simplified and pruned) structures for the event and the participant readings of (36), respectively (i for interpretable, u for uninterpretable, R for root):



Note that the [uPl] on R is valued by the external [iPl] on the DP in (38), and the internal [iPl] on NbP always values the [uPl] on np, in both structures. As for the adjoined [iPl] to R in (37), it is interpreted on the root, by virtue of being a modifier, and it requires no probe–goal relation.<sup>13</sup> The event or participant readings are both instances of plurality, and in each case, it is the verb which is morphologically marked. Plurality of verbs can be built on their nominal dependents (arguments, complements, adverbs, etc.), and Pl marking on verbs is either interpretable, or it is a formal (agreement) marker with a DP dependent. Pl may act as a head of the root, or as its modifier.<sup>14</sup>

13. See Wiltschko (2008) on the head/modifier status of Pl, as well as the logic of this reasoning.

14. Fassi Fehri (2000, 2003) qualifies the event and participant readings as collective and distributive, respectively. Complexity and incrementality involved in verb classification may be operated either through a related series of verbs (as in Chinese), or through composition of verbs and their dependents (see Fassi Fehri (2005), Huang (2004) and Fassi Fehri and Vinet (2008)).

1.3.2 *Collective and distributive plural*

Consider the following (apparently equivalent) pair of sentences

- (39) *zarraḥa            zarbaṣat-u   zunuud-in   tʿifl-an*  
wounded.intens   four-NOM   soldiers-GEN   child-ACC  
“Four soldiers wounded intensively a child”.
- (40) *zarbaṣat-u   zunuud-in   zarraḥ-uu            tʿifl-an*  
four            soldiers-NOM   wounded.intens-PL   child-ACC  
“Four soldiers wounded intensively a child”.

In (39), the plural individual paired with the event is collectively involved in that event, in conformity with Landman's (1996) Collective Criterion. The singular indefinite fails to distribute. There is one (minimal) event involved, or a series of identical sub-events, performed by the same subject participant, and one child involved. The event is collective (or weakly distributive). The interpretation is that four soldiers collectively or cumulatively inflicted many wounds to a single child. In (40), the SVO version of (39), the distinctive interpretation (in addition to those found in (39)), is significantly distributive. It can mean that each of the four soldiers has wounded one child. The outcome would then be up to four children intensively wounded. The strongly distributive interpretation finds presumably its origin in the pluralization of vp, which is manifested by the plural inflection on the verb.

1.3.3 *Semantic Pl in SVO*

Arabic SVO and VSO alternations in word order and agreement have been traditionally treated as either formal (see Harbert and Bahloul (2002) for an overview, as well as Bahloul (2007)), or discourse based alternations (see e.g. Fassi Fehri (1988)). But, as we have seen above, there is a sense in which such alternations have in fact a semantic source. In VSO, the vp/TP is not pluralized, and its DP subject presumably lacks the Pl projection at the DP level. In SVO, by contrast, both the vp/TP and the (external) DP are pluralized. As a consequence, VSO and SVO orders are not semantically (neither morpho-syntactically) equivalent: Pl of vp (and its interpretation) is present in SVO, but lacking in VSO.

Consider again the following alternating constructions:

- (41) *daxxana   zarbaṣat-u   riḥaal-in   siḥaarat-ajni*  
smoked   four            men            cigarette-dual  
“Four men smoked two cigarettes”.
- (42) *zarbaṣat-u   riḥaal-in   daxxan-uu   siḥaarat-ajni*  
four            men            smoked-PL   cigarette-dual  
“Four men smoked two cigarettes”.

VS has no Pl/Nb agreement. Its interpretation is basically collective/cumulative. It means that four men collectively (or cumulatively) smoke two cigarettes in total, and not more. In the SVO (42), there is a distributive reading of the event whereby for each smoking of two cigarettes, there is an agent/participant who could be 1, 2, or 3 (but not 4). The outcome is that 4 to 8 cigarettes may have been smoked. As explained, this result can be reached by assuming that vp is pluralized. In other words, the Pl must be interpretable on both the vp/TP and the DP. If so, then a mechanism of feature value sharing is needed, more than a mechanism of valuation of the sort I used earlier. Such a choice is important for deciding whether Pl can ever be a head of vp, and interpretable on it, or only a modifier (with an interpretable feature), or an agreement marker (with a non-interpretable feature).

There is evidence that the subject DP in VSO has no Number (or Plural). With simple plural DPs, the verb manifests no Pl marking, as in (39) above. Even the first conjunct does not agree in Number with verbs when it is nominal:

- (43) *hadʿara   raḥul-aa-ni   wa-ḥanta            (\*ḥaḍar-aa, dual)*  
came   man-dual   and-you  
“Two men and you were present”.

This suggests that with nominal conjoined DPs, the DP has no Number in VSO. But when the subject is pronominal, the verb appears to agree in Number with the first conjunct:

- (44) *hadʿar-tumaa   ḥantumaa   wa-ḥanaa*  
came-2.dual   you two   and-I  
“You and I were present”.

But observe that there is no Number (or Person) resolution in this case, although there is resolution in the SVO counterpart (where Person is 1, rather than 2, and Number is Pl, rather than dual):

- (45) *ḥantumaa   wa-ḥanaa   hadʿar-naa*  
you two   and-I            came-1PL  
“You and I were present”.

I take phi feature resolution phenomena to be a diagnostic for vp pluralization through a plural DP (external/inflectional/phrasal Pl). Since there is no Number or Person resolution with respect to the whole DP in (48), it is reasonable to think that the (conjoined) DP has no Number or Person features. Agree is then with np, which has Person, but not Number. Presumably, v-T has also a Person feature, but no Number in VSO. Valuation/Agree then proceeds with Person of the first conjunct, but not Number, since the vp is not pluralized. The first

conjunct requirement follows if the two members of the conjunct are asymmetrically configured. Furthermore, a pluralized vp has to be c-commanded by a plural DP. When v asymmetrically c-commands DP, DP cannot transmit its Number to it, or no Agree relation is possible between the two constituents.<sup>15</sup>

#### 1.3.4 Collective and non-collective plural agreement

Consider again the pair of sentences in (13 a&b) above, repeated here as (46) and (47) for convenience:

(46) *n-naas-u t-usʿallii li-rabb-i-haa*  
 the-people-NOM 3f-pray for-god-GEN-her  
 “People pray for their God”.

(47) *n-naas-u j-usʿall-uu-na li-rabb-i-him*  
 the-people-NOM 3-pray-PL-IND for-god-GEN-their  
 “People pray for their God”.

In one reading, both constructions are interpreted as denoting a collective (or a group) event. The subject controls the verb and the pronoun, and both agree with it in ‘gender’, but not number. Collective/classifier agreement has, in fact, a collective/group (rather than feminine) feature, which is interpretable as a singleton plurality, or a sum-unit. It is presumably the subject *naas* that has an interpretable group value, and the group/Cl morphology on the verb is uninterpretable. Clearly, *naas* is not ‘feminine’ per se, as demonstrated by its occurrence with a masculine (singular) agreement, or its ability to control a plural masculine pronoun or anaphor:

(48) *j-usʿallii n-naas-u li-raabb-i-him*  
 3-pray the-people-NOM for-god-GEN-their  
 “People pray for their God”.

(49) *j-usʿallii n-naas-u basdʿ-u-hum masa basdʿ-in*  
 3-pray the-people-NOM some-NOM-them with some-GEN  
 “People pray with each other”.

As explained above, the alternations in (46)–(49) exhibit different patterns of (normal) plural agreement. Clearly, *naas* is plural in some sense, and cannot be singular, although its plurality has two manifestations (as sums, or as groups). The two available plural readings exclude the singular reading.

15. See Fassi Fehri (2009) and references cited there for more discussion of agreement configurations.

## 2. Pro in consistent NSL Arabic

Consider the silent pronoun (so-called Pro) in the following pair of sentences:<sup>16</sup>

(50) *j-aʒlisu hunaa*  
 3-sit here  
 “He sits here”.

The inflected verb here supports only an interpretation in which the null subject is a referential third masculine pronoun. This situation contrasts with that found in Finnish (also a null subject language), but in which (51), the counterpart of (50), is only interpreted as implicating a generic pronoun:

(51) *Tässä istuu mukavasti*  
 here sits comfortably  
 “One can sit comfortably here”.

Such a language has been termed a partial NSL, in comparison with Arabic, which is a consistent NSL. In such a language, the normal way to get the generic interpretation is to use passive voice, as in (52):

(52) *j-u-ʒlasu hunaa*  
 3-PASS-sit here  
 “One sits here”.

So far, descriptions of Arabic have focused their attention on ‘referential’ Pro, in which the pronoun is either incorporated, as in Fassi Fehri (1993), or identified by the inflection *la* Rizzi (1982), as proposed very recently by Eid (2008). But Fassi Fehri (2008) proposed a correlative treatment of referential and generic silent subjects in Arabic, based on Agree, in which referential (1,2,3 Person) pronouns Agree with T, whereas generic (Ø Person) ones Agree with Voice (passive). Since third person inflection is always associated with Person in consistent NSL like Arabic, it is proposed that there are no subject expletives in these languages.

### 2.1 The referential/non-referential correlation

NSL like Arabic are known to make massive use of silent subject pronouns when the inflection on the verb is rich enough to induce the right pronominal interpretation. Hence in (53)–(55), the verbal inflection (in bold) is associated

16. This part is based on Fassi Fehri (2008, to appear).

with 1st, 2nd, or 3rd personal pronoun, respectively, although the pronoun there is not pronounced:

- (53) *ʔ-ʔʔkul-u*  
1-eat-IND  
“I am eating”.
- (54) *t- ʔʔkul-u*  
2-eat-IND  
“You are eating”.
- (55) *j- ʔʔkul-u hunaa*  
he-eat-IND here  
“He is eating here”.

What is less known, however, is the fact that the 3rd person (masculine singular) inflection in (55), supposedly a non-person, must ONLY be associated with a referential or definite pronoun, and cannot be non-referential or generic. It cannot mean something like English ‘one’, or French ‘on’:

- (56) a. On mange ici.  
b. One eats here.

In other words, the third person inflection on the verb cannot be associated with an interpretation of an indefinite pronoun. For concreteness sake, I assume that the referential 3rd person *is* a specified person, which I identify as +3R (R for referential), or more simply 3. I interpret 3 as combining the negative values given in (60):

- (57)  $3 = [-1, -2]$

As for the generic third person pronoun in (56), it is typically not specified for any person (contrary to the third pronoun in (55)). It is not a (designated) 3, 1, or 2. Let us associate it with [Ø Person], or more simply Ø. In consistent NSL, third person inflection can be associated only with 3, not Ø pronouns.

Holmberg (2007) has observed that in languages like Finnish, which are only partial (or non-consistent) NSL, the subject third person pronoun can be null in precisely the contexts in which it cannot be in Arabic, contexts like (51) above. In these constructions, the interpretation is limited to that of a generic pronoun, basically [Ø] in my system. Holmberg attempted to relate the two kinds of pronoun deficiency observed in consistent NSL and partial NSL through an inverse or negative correlation between the occurrence of referential pro, (my [3 Pers]), and that of generic pro, (my [Ø Pers]), as follows:

- (58) a. If a language has a null 3rd person referential subject, it does not have a null generic one.  
b. If a language has a generic null subject, it does not have a null 3rd referential one.

This correlation is essentially correct, and it accounts nicely for the distribution of silent pronouns in NSL. It straightforwardly captures e.g. the difference in interpretation between Arabic and Finnish third person pros.

But the correlation is in need of refinement. In languages like Arabic, it is not true that the silent generic or arbitrary pro is not found. Rather, it is conditioned by the use of a passive form of the verb, as in (59):

- (59) *j-u-ʔlas-u hunaa waqt-a l-istiraahat-i*  
3-PASS-sit-IND here time-ACC the-brake-GEN  
“One sits here at brake time”.

The construction (59) is structurally equivalent to (51). It does not support a *by*-phrase, and its hypothesized syntactic indefinite pro subject has the properties described above (see also Section 4 below for more properties). But this kind of Pro interpretation is found only with passive forms. If this is so, then Holmberg’s correlation in (62) is in need of refinement. Thus it is not the case that consistent NSL do not have a generic (or arbitrary) Pro. They *do*, although only in the passive Voice. Consequently, (58) cannot be read with an inverse value, in a bi-directional way, as explicitly stated in (60):

- (60) If L has [ $\alpha$  ref Pro]  $\leftrightarrow$  L has [ $\beta$  gen Pro], where  $\alpha$ ,  $\beta$  have + or – values, and  $\alpha \neq \beta$ .

This is so because there is another part of the description which is missing here, which has to account for the ‘on’ use of passive in Arabic, more like what is happening with French ‘on’, or Finnish 3rd sing inflection.

In order to account for referential and non-referential pro distribution and variation, we then need to articulate a complex theory of silent pronouns which investigates how the licensing of pro depends not only on Tense, but also on Voice. As I will show, this theory is partly based on the following assumptions:

- (61) a. Definite/referential pros in consistent NSL arise as ‘topics’ (re)Merged to a ‘rich’ T, which they Agree with. T carries an unvalued { $\pm 1, \pm 2$ }Pers.  
b. Indefinite/non-referential pros in consistent NSL arise as ‘topics’ (re-)Merged to a ‘rich’ Voi(ce). Voi carries an unvalued [ØPers].

I make use of Agree as a probe–goal relation, construed as follows:<sup>17</sup>

- (62) Agree ( $\alpha$ ,  $\beta$ ) if
- $\alpha$ ,  $\beta$  have matching features
  - $\alpha$  closely c-commands  $\beta$  (i.e. there is no  $\gamma$  with matching features such that
  - $\alpha$  commands  $\gamma$ , and  $\gamma$  c-commands  $\beta$ ); or  $\beta$  closely c-commands  $\alpha$
  - $\alpha$  and/or  $\beta$  has unvalued F.

## 2.2 Impersonals/indefinites

### 2.2.1 Generic

Generic (impersonal) meanings can be expressed via ‘we’ 1pl (inclusive), ‘you’ 2sg (non-exclusive or potentially inclusive), 2pl (exclusive), and 3pl (exclusive):

- (63) *baṣḍa l-xuṯʿab-i t-aʒid-u ʔanna l-ʔassaar-a rtafaṣ-at*  
after the-speeches-GEN 2-find that the-prices-ACC went.up-FEM  
“After speech, you will find that the prices have gone up”.
- (64) *fii sʿ-sʿahraaʔ-i j-u ḥibb-uu-na f-faaʔ-a l-muḥallaa*  
in the-sahara 3-like-PL-IND the-tea-ACC the-sugared  
“In the Sahara, they like sweet tea”.
- (65) *mina l-xataʔ-i ʔan na-stashil-a l-ḥuluul-a*  
of the-mistake to we-easy-SUBJ the-solutions-ACC  
“It is a mistake to think that the solutions are easy”.

The meaning is basically ‘people in general, I and you included, or excluded’. The use of 1sg or 3sg is notably excluded in this interpretation. The 3sg generic (impersonal) is expressed only via a form of passive:

- (66) *j-u-taxaaṣʿamu ʔilaa ʔabii bakr-in*  
3-PASS-complain to Abii Bakr  
“People complain to Abii Bakr”.
- (67) *j-u-sbaḥu hunaa bi-duuni muqaabil-in*  
3-PASS-swim here without counterpart-GEN  
“One swims here without paying”.

The following descriptive statements are then true of Arabic:

- (68) a. 3rd sg active inflection cannot be associated with a generic pronoun.  
b. Only 3rd sg passive inflection can be associated with a generic pronoun.

17. For the relevance of closest c-command for Agree, see especially Chomsky (2000) and Carstens (2005). See also Fassi Fehri (2007). For the bidirectional part, see Baker (2008).

Due to the variation observed above in interpreting the various generic pros, it is reasonable to think that 3sg passive inflection is associated with the most general Pro, interpreted as general number, general person, and general clusivity. Assuming that generality is a specification which has a [ $\emptyset$ ] value, we can confidently propose that the inflection in (66), basically [j–u], is associated with a generic pro, which has the following description:<sup>18</sup>

- (69) Generic Pro: [ $\emptyset$  Number,  $\emptyset$  Pers,  $\emptyset$  Clusive].

Note that in addition to the previous intransitive uses which induce ‘impersonal’ generics, transitive impersonals are also found:

- (70) *wa-j-u-xraj-u la-hu jawm-a l-qijaamat-i kitaab-an*  
and-3-PASS-brought to-him day-ACC the-resurrection-GEN book-ACC  
“And someone brought to him a book the day of the resurrection”.

Moreover, the use of the passive inflection with episodics yields a quasi-existential reading:

- (71) *yurrir-a bi-naa*  
trapped-PASS-3 with-us  
“Someone trapped us. We were trapped”.
- (72) *j-u-ntadʿar-u ʔan j-u-slan-a ʔan taʔkiil-i l-ḥukuumat-i*  
3-PASS-expect that 3-PASS-announce on formation the-government  
“People expect that the formation of the government will be announced”.

Note also that the construction is also used for middle and modal readings:

- (73) a. *ʔajʔ-un laa j-u-sʿaddaaq-u*  
thing-NOM not 3-PASS-believe  
“It is an unbelievable thing”.
- b. *ḥarr-un laa j-u-ʔaaq-u*  
heat-NOM not 3-PASS-bear  
“It is an unbearable heat”.

I will concentrate on the generic 3sg interpretation only, leaving the other interpretations aside.

18. The complex [j–u], which associates the phi part [j–] and the passive part [–u–], is used here for the generic inflection, to avoid confusion with the simple 3rd person inflection [j–], found with actives. Clusivity refers essentially to a distinction between inclusive and exclusive first-person pronouns. E.g. inclusive ‘we’ includes the addressee (it means “you and I”), while exclusive ‘we’ excludes the addressee (it can then mean “he/she and I”). See Cysouw (2003), 101–165, among others, for detail.

### 2.2.2 The human feature

One feature of meaning which typically distinguishes impersonal from personal passives is the feature [+human]. And although the traditional terminology uses the term ‘impersonal passive’ to designate these constructions, it is not clear that the construction is impersonal or passive. For example, so-called impersonal passives require in their interpretation the presence of an indefinite human agent, rather than a subject which the passivised intransitive predicate would select semantically (such as ‘canine’ for ‘bark’):

- (74) *Zapukano-no do drzwi*  
bark-PASS.part[+hum] at door  
“There was barking at the door.” (Polish. Frajzyngier 1982)
- (75) *An der Tur wurde gebellt*  
at the door was barked [+hum]  
“At the door there was a human barking”. (German. Abraham & Leiss 2006)
- (76) *Qui si abbiaa tutto il giorno*  
here si barks all the day  
“Here people bark all day long”. (Italian. D’Alessandro 2004)
- (77) *ruqis<sup>f</sup>-a hunaa*  
danced.PASS here  
“Some people (\*bees) have danced here.” (Arabic. Fassi Fehri 1998b).

In contrast, personal passives are not so restricted:

- (78) *zukila kull-u t-tuffaah-i*  
ate.PASS all-NOM the-apples-GEN  
“All apples were eaten (dogs may have eaten the apples)”.

It is presumably the case that the [+human] value is a default (range) associated with Person. Cardinaletti and Starke (1999) provide a detailed discussion of this feature value, and motivate its default character. They observe that generics, but not impersonals, can occur in the strong form of pronouns.<sup>19</sup>

19. Structurally, the referential features attributed to the highest functional projection of noun phrases (which they take to be CP) are referential indexes. Deficient, but not strong pronouns, lack CP and referential index. Having no C, deficient pronouns contain no [+human] specification, and are thus free to co-refer with any antecedent. C need not contain two distinct sets of features: index/range and human. In C, a [+/-human] feature can be seen as *part* of the features which constitute range. In fact, [+human] is a default range feature (pp. 158–9). C still contains two distinct features: index and case, K. In fact, index is not a feature *besides* K in C, but rather *index is the interpretation of K*. (pp. 187–190). Cardinaletti & Starke take the interpretation of impersonals to be always arbitrary, associated with a default set of features,

### 2.3 Referential pro

#### 2.3.1 A topic approach

Consider the following sentences:

- (79) *t-aktub-na*  
2-write-FEM.PL  
“You (FEM.PL) write”.
- (80) *zantunna t-aktub-na*  
YOU.FEM.PL 2-WRITE-FEM.PL  
“You (FEM.PL) write”.

I claim that (79) has basically the same structure as (80), except that the topic pronoun is not pronounced in the former.<sup>20</sup> The topic shows up again when it is attached to a complementizer:

- (81) *zinna-kunna t-aktub-na*  
that-you 2-write-FEM.PL  
“Indeed, you (FEM.PL) write”.

The ungrammaticality of (82) confirms that there must be a silent pronoun in (79), satisfying a form of EPP, since an expletive cannot be inserted in this context:

- (82) \**zinna-hu t-aktub-na*  
that-it 2-write-FEM.PL  
Note that an expletive topic is compatible with a generic pro, as in (83):

including [+human] cross-linguistically. Arbitrary has both range and theta-role, expletive neither. Bearing a theta-role implies having range. If the deficient arbitrary has a theta-role, but no range in syntax, a default range is inserted at the (post-syntactic) semantic interface: [+human] (n. 59, p. 225).

I reinterpret Cardinaletti & Starke’s observations about range by stating that Pro impersonals, arbitrary and generic have C/D (and hence range), and their human value is assigned by default. Strong pronouns have specified C/D. The [+human] value, I assume, is associated with [+Pers], which bears a theta-role. But contra C & S, strength is not a property of generics, as evidenced by the behavior of Arabic silent generics.

20. I use the term ‘topic’ here tentatively. The latter occupies a pre-verbal A’ position which may not be dedicated only to the discourse function ‘topic’ (see Fassi Fehri 1993 for evidence that this position is not limited to standard topics). As a matter of fact, the pronoun in (86) may be a (unstressed) topic, or a (stressed contrastive) focus. On the other hand, it may sound awkward to think of expletives as topics in terms of information structure. In the worst case, topic is a cover term for whatever nominal constituent shows up pre-verbally, and satisfies a form of EPP, hence requiring T to have a Spec. But see Section 5 below for an alternative analysis.

- (83) *zinna-hu j-utaxaaşamu zilaa zabii bakr-in*  
 that-it 3-PASS-complain to Abii Bakr  
 “Indeed, people complain to Abii Bakr”.

These contrasts suggest that the referential pro in (79) is higher than T, not lower, as is the case of non-pronominal VS subjects:

- (84) *zaaʔa-t l-banaat-u*  
 came-F the-girls-NOM  
 “The girls came”.

I assume that the lexical subject here does not satisfy EPP. Hence an expletive topic can be inserted there:

- (85) *zinna-hu zaaʔ-at l-banaat-u*  
 that-it came-FEM the-girls-NOM  
 “Indeed, the girls came”.

The expletive topic in (85) does not agree with the subject in (almost) any feature, except (optionally) Gender. No Definiteness Restriction (DR) is observed there, contrary to what is found normally with subject expletive chains. In (80), the pronoun has either moved or re-merged, after having first merged as Spec of vp, and the agreement/resumption is spelled out on T/I. The same is true when a lexical subject is merged as a topic in Spec TP, as in the following example:

- (86) *l-banaat-u j-aktub-na*  
 the-girls-NOM 3-write-FEM.PL  
 “The girls write”.

The outer position (Spec T) has been taken to be an A'-position by Fassi Fehri (1981, 1988a), Bakir (1980), in a sort of CLD (clitic left dislocation). If that analysis is correct, DP or pro there is satisfying a form of EPP, contrary to the subject in VSO. That preverbal subjects in NSL involve CLD has been notably argued by Barbosa (1995) and Alexiadou & Anagnostopoulou (1998).

One relevant test for CLD has to do with the positioning of adverbs. In a SVO language like French, a number of adverbs cannot intervene between S and V, unlike the situation in Arabic:

- (87) \*Jean probablement a rencontré Marie.

- (88) *r-raʒul-u yalibammaa j-aktubu f-fişr-a*  
 the-man-NOM often-that 3-write the-poetry-ACC  
 “The man often writes poetry”.

- (89) \**j-aktubu ǧalibammaa r-raʒul-u f-fişr-a*  
 3-write often-that the-man-NOM the-poetry-ACC

- (90) *r-raʒul-u j-aktub-u samd-an f-fişr-a*  
 the-man-NOM 3-write deliberately-ACC the-poetry-ACC  
 “The man deliberately writes poetry”.

The ungrammaticality of (89) confirms the validity of the adjacency requirement of V and S in Arabic, rather than S and V. The fact that SV adjacency does not hold, as in (88), suggests that the preverbal constituent there does not behave as a subject.

A second test is that indefinites in preverbal position receive an unambiguous interpretation, compared to those in post-verbal position:

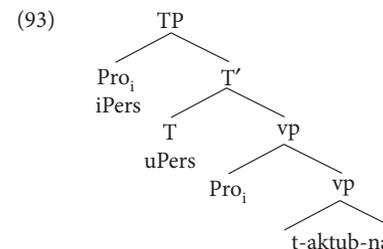
- (91) *baqarat-un t-unşif-u kull-a qarjat-in*  
 cow-NOM 3-make.alive every-ACC village-GEN  
 “A cow makes alive every village”.

- (92) *t-unşif-u baqarat-un kull-a qarjat-in*

In (92), the indefinite can be non-specific and distributive, while the indefinite is rigidly specific (and collective) in (91). The unambiguous scope is a property of CLD topics, not of subjects.

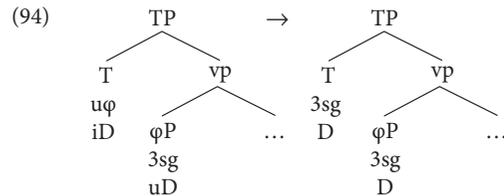
### 2.3.2 A Probe-Goal Implementation

Following a quasi-general consensus, let us assume that constructions such as (86) have syntactically projected null subjects or pros. According to Rizzi (1986), pro is inherently unspecified for feature values. Its distribution is regulated by a licensing condition and a recovery (or identification) condition. But as observed by Holmberg (2005), such a theory of pro cannot be maintained in current minimalist theory, which makes essential use of the distinction between interpretable and uninterpretable features (cf. Chomsky (1995)). He then hypothesizes that the null subject is specified for interpretable features, values the uninterpretable features of I/T, and moves to (or re-merges in) Spec IP/TP, just like any other subject. The nullness of the subject is then essentially a phonological matter: it is a pronoun that is not pronounced. In line with this reasoning, I propose that the basic structure for a construction like (86), containing a silent referential pro, is as follows (i for interpretable, u for uninterpretable):



In this structure, *pro* is first merged in its theta-position, as Spec *vp*, and re-merged as a topic in Spec *TP*. It is the latter *pro* which values the unvalued *Pers* feature on *T*.

This structure comes close to the structure assumed by Holmberg (2007, p. 7), according to whom a subject in a consistent NSL is *aφP* with a *uD* feature. *T*'s *uφ* features are valued by the subject, the subject's *uD* feature and Case-feature will be valued in return (the structures here are adjusted):



The important difference is that *T* in (93) has no interpretable pronominal feature. Rather, *Pers* (or *D* in Holmberg's analysis) appears as unvalued on *T*. Moreover, the valuation is downward, rather than upward, compared to that in (94), where *φ* is valued upward. It is the topic *pro* which (re-)merges upward, prompted by the unvalued feature of *T*.

#### 2.4 'Passive' 'impersonal', 'indefinite'

No significant attempt is available in the literature to provide a unified (or even partially unified) treatment of impersonal and personal passives. Recently, Collins (2005) proposed a new version of the 'Case absorption' thesis to treat the personal passive:<sup>21</sup>

- (95) a. active: – *v* assigns external theta-role &  
           – *v* checks accusative  
       b. passive: – *v* assigns external theta-role &  
                   – Voice checks accusative

This sort of analysis deals essentially with the 'promotion' part (of the object), as a consequence of the absorption of the accusative case by Voice. The 'demotion' part of the passive, which is the common denominator of impersonal and personal passives, is not taken into consideration.

21. The case absorption theory of passive has been defended by Jaeggli (1986) and Baker, Johnson, & Roberts (1989). The theory of Voice developed here has an early origin in Fassi Fehri (1988b). See also Ouhalla (1991) for a similar treatment. The theory is not based on case absorption.

If impersonal and personal passives are treated on a par, then the characterization of Passive cannot depend essentially on absorption of (accusative case) as a core property, since impersonal transitives do not share such a property. As a matter of fact, Passive involves, after all, a weakening of the 'referentiality' of the subject pronoun, which is encoded on Voice inflection. Assuming that passive Voice has a subject *pro* (which remains unpronounced), the latter must be carrying only a weakly specified Person. But the Person specification with 'impersonal' passive must be stronger, compared to that of 'personal' passive, since an impersonal construction prevents the promotion of the object (hence giving rise to transitive impersonals). But *Pers* there is not strong enough, to check EPP, or to prevent expletives from surfacing as topics, as is the case with referential *pro* (see the contrasts (82) and (83) above). I assume then that impersonal passives has a *pro* which is marked as [*Ø Pers*], in lines with the proposals made above.

If a silent pronominal subject is to be postulated in the syntactic structure of passives (as in Baker, Johnson, & Roberts (1989)), then such a *Pro* is syntactically more active in impersonal than in personal passives. In the former case, it has more 'referential' content, and hence can bind anaphors:

- (96) *j-u-tasallal-u fard-an fard-an sabra l-hawaazizi*  
 3-PASS-infiltrate individual-ACC individual-ACC across the-barriers  
*dasimiina basd<sup>f</sup>-un basd<sup>f</sup>-an*  
 supporting-PL.ACC each-NOM each-ACC  
 "People will infiltrate through barriers, supporting each other".

Here the silent *pro* binds the reciprocal. It also controls the secondary predicate (which is plural). Further examples of control of secondary predication are given in (97) and (98):

- (97) *j-u-ntalaqu rukuub-an min hunaa*  
 3-PASS-depart riding.PL-ACC from here  
 "People will depart riding (horses) from here".
- (98) *kaana j-u-ɾtaa ɾilajhi furaadaa wa-zamaasaatin*  
 was 3-PASS-come to-him individuals and-groups  
 "People came to him, as individuals and groups".

Furthermore, impersonal passives can control internal anaphora. Thus an internal reflexive can be made impersonal, but it remains controlled by the subject *pro*:

- (99) *j-u-y-t-asal-u hunaa*  
 3-PASS-reflex-wash-indic here  
 "One washes oneself here".

Such properties are not found with personal passives. For example, their silent pronoun cannot control secondary predication:

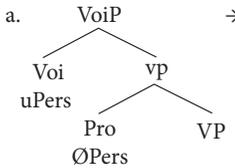
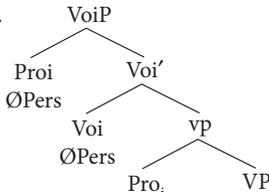
- (100) \*? *j-u-ʔkal-u t-tuffaah-u furaadaa wa-ʔamaasaatin*  
 3-PASS-eat the-apples-NOM individuals and-groups  
 Personal passives cannot bind anaphors either:

Personal passives cannot bind anaphors either:

- (101) *j-u-ḡsal-u \*nafs-u-hu/\*nafs-a-hu hunaa*  
 3-PASS-wash-indic self-NOM-him/self-ACC-him here  
 Intended to mean: “it washed himself here”.

Although it has been proposed that the implicit argument in personal passives has properties akin to arbitrary PRO (see Baker, Johnson, & Roberts (1989)), it is clearly referentially weaker than the pro involved in impersonals, as we have seen by various tests. Moreover, it does not (normally) have the human property, nor any of the clusivity interpretation amply attributed to the impersonal in the literature (see e.g. Moltmann (2006), Holmberg (2007), Cabredo Hofherr (2006)).

The differences in interpretation can be taken into account if we assume that the impersonal in Arabic is a pro specifier of Voi(ce), whereas the personal passive is a complement pro of Voi(ce). The impersonal passive then has basically the following structure:<sup>22</sup>

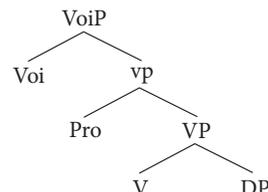
- (102) a.  → b. 

Passive merges as a head, then triggers re-Merge of pro (when impersonal). I assume that Voice has an unvalued Pers, which prompts re-Merge. Valuation takes place downward, as in the case of topic agreement. This form of Agree with Voice, I assume, is limited to languages with ‘impersonal’ passives, which in fact involves a Pers, although of a special value, i.e. [ØPers].

As for personal passive, its silent pronoun has presumably no [ØPers], as evidenced by its defective behaviour with respect to binding anaphors and secondary

22. Voice is assumed to project above v and lower than T (see e.g. Fassi Fehri (1988b), Ouhalla (1991), and Collins (2005), among others).

predicates. Its status is comparable to that of a non-referential pro in Finnish, which surfaces in a rather low position, not in Spec of TP, but rather Spec vp (see Holmberg (2007)). A somewhat similar treatment can be proposed for personal passive, except that pro in vp is a complement of Voi (rather than T). If ‘personal’ Voi has in fact no Pers feature to be valued by pro, then there is a room for the DP object to be ‘promoted’, that is, to Agree with Voi, when it (re-) merges in Spec Voi. The basic configuration to which such operations apply is roughly the following:

- (103) 

In such a configuration, Voi is probing the object DP, rather than pro, unlike what happens in ‘impersonal’ passives, in which it is pro which acts as a goal for Voi.<sup>23</sup> If so, we have a clear parallel in VoiP/vp to what is found in TP/CP. In the latter case, pro can merge as a Spec topic in TP, or as a Comp (non-topic) of T (e.g. in SVO and VSO configurations). In the former case, impersonal passive merges a ‘topic’ pro in Spec Voi, whereas personal passive merges a (non-topic) pro as Comp of Voi (in vp).

## 2.5 Expletives and EPP

Expletive pronouns are found in non-thematic positions, where their occurrence is most often formally licensed. One commonly acknowledged formal licensing device for expletives in subject positions is EPP, which requires a D-feature of T to be valued by some Specifier (or subject), normally located in Spec T. But Arabic pronominal candidates are normally found in positions which qualify as ‘topic’, rather than subject positions. On the other hand, these topics, even if they are taken as expletives, have the role of ‘backgrounding’, in the sense of Hopper (1979). Moreover, I see no evidence for postulating the existence of subject expletives (and especially silent ones). The non-existence of expletive pros in Arabic is consistent with the view that (3rd person) T in this language is strongly personal, as discussed above in Section 1.

23. Which ingredient probes for the DP object, rather than the DP subject, must find its origin in weakness of Person specification, rather than (absence of) Case, as in the traditional case absorption hypothesis.

2.5.1 *Arabic expletives*

Consider first sentences with non-human pro as referent, found in e.g. Italian:

- (104) *piove*  
rains  
“It rains”.
- (105) *è costoso*  
is expensive  
“It is expensive (around here)”.

Such cases, in which pro can be reasonably taken as (quasi-)argumental (rather than expletive), have no Arabic counterparts. First, atmospheric predicates have lexical, rather than pronominal subjects:

- (106) a. *ʔamtʔara-t s-samaaʔ-u*  
rained-F the-sky-NOM  
“It rained”.
- b. *saqata θ-θalʔ-u*  
fell the-snow-NOM  
“It snowed”.

Second, Arabic has no close counterpart of (105). To express such a meaning, Arabic may use a demonstrative, rather a pronominal:

- (107) *haaʔaa mukallif-un*  
this expensive-NOM  
“This is expensive”.

But whatever the differences between Arabic and Italian in expressing these meanings, they have to do with the lexical range of what can qualify as a third referential pro (or pronoun) in each language, rather than with expletives.

Let us look now at more standard cases of expletives. Among those are constructions which involve an expletive preverbal subject and a post-verbal NP/DP associate, the English *there*-type, or the French *il*-type:

- (108) There arrived a man, \*the man, \*every man.
- (109) Il est arrivé un homme, \*l’homme, \*tout homme.

As illustrated here, one striking property of the NP/DP associate is the DR effect. Chomsky (1995) proposes a syntactic analysis of DR effects, where the expletive in Spec AGRS has the D categorical feature, and its NP complement associate is left as non-specific. But as amply observed in the literature (see e.g. Alexiadou & Agnastopoulou (1998) and references cited there), DR effects are systematically

absent in NSL. Thus if a sentence like (110) is taken to be an ‘inverted’ construction, along the lines of Rizzi (1982, 1986), then there is no DR effect there:

- (110) *wasʔala l-muʔtamir-uuna*  
arrived the-congressmen-NOM  
“The congressmen arrived”.

More importantly, there is no independent evidence for expletive pro Merge in the structure of this construction. Since an element included in the numeration has an effect on PF and/or LF, expletive pro cannot be included in the derivation of such a case, having no effect on PF, and none on LF, as evidenced e.g. by the non-existence of DR effects, and in fact any LF effect that can be associated with the empty expletive. This becomes clear once the semantics of such constructions is compared with that of constructions in which an overt expletive pronoun is found.<sup>24</sup>

Consider the following constructions:

- (111) *huwa l-laah-u rabb-ii*  
he Allah-NOM lord-mine  
“It is Allah my Lord”.
- (112) *hijja l-hajaat-u*  
she the-life-NOM  
“It is life”.

These sentences are headed by a pronoun which is traditionally termed *dʔamiir f-ʔaʔn* ‘pronoun of matter’ (or ‘importance’). This pronoun is used to introduce or announce a salient event or entity, which comes after the pronoun. Let us call it a ‘backgrounding pronoun’, given that the event may be taken as the foreground. Backgrounding pronouns may take a strong form of the pronoun, and they inflect for Number and Gender, typically when they are used in verbless sentences such as (111) and (112) as a kind of expletives. I take them to be expletives because they have no definite or indefinite content. Another form of such pronouns, I assume, but in a weak (clitic) form which does not inflect for Number, is when they are used in front of a VSO structure, as in the following embedded sentences:

- (113) *ʔudakkir-u-ka ʔanna-hu tamma l-ittifaaʔ-u*  
I-remind-you that-it achieved the-agreement-NOM  
“I remind you that the agreement has been achieved”.

24. One might wonder how expletives can have LF motivation. If Chomsky’s (1995) analysis of the expletive chain is correct, then the expletive bears some LF content, leaving its associate without any interpretable D feature. Likewise, backgrounding expletives, which will be discussed below, have presumably some discourse content, which makes its interpretation distinct from contexts in which it is absent. See footnote 24 for further discussion.

- (114) *ʔudakkir-u-ka ʔanna-hu wasʔala kull-u l-muʔtamir-iina*  
 I-remind-you that-it arrived all-NOM the-congressmen-GEN  
 “I remind you that all the-congressmen arrived”.

In such contexts, the overtness of the expletive is obligatory, basically because the complementizer assigns accusative case, which the topic expletive satisfies. The expletive is then at least formally licensed. As for the backgrounding interpretation, it is still detectable, once we compare e.g. (114) to its close synonym (115), where no such interpretation is found:

- (115) *ʔ-udakkir-u-ka ʔanna kull-a l-muʔtamir-iina wasʔal-uu*  
 I-remind-you that all-ACC the-congressmen-GEN arrived-PL  
 “I remind you that all the congressmen arrived”.

The question now is whether the backgrounding topic pronoun can be empty, once we use a simple verb-first sentence like (110), or whether the structure there does not support any silent pronoun. As far as I can tell, such sentences do not yield a foregrounding interpretation, and hence an LF motivation for such a pro is lacking.

Let us turn now to other standard cases where it is tempting to postulate null expletive subjects. The latter include modal constructions such as the following:

- (116) *j-anbayii ʔan t-aquul-a l-ḥaqq-a*  
 3-prefer that you-tell-ACC the truth-ACC  
 “It is preferable that you tell the truth”.

It also includes raising constructions with *seem* verbs:

- (117) *j-abduu ʔanna-ka raadʔin*  
 3-seem that-you happy  
 “It seems that you are happy”.

Psych verb constructions such as the following also seem to need such a null subject:

- (118) *raaʔa-nii ʔan ʔaḥduḥa haadʔaa*  
 threatened-me that happens this  
 “It threatened me that this happened”.

Finally, ‘tough’ constructions are usually included in such a list:

- (119) *mustaḥiil-un ʔan n-attaʔiq-a*  
 impossible that we-agree-ACC  
 “It is impossible for us to agree”.

In these constructions, there is no overt pronominal subject, only a CP sentence following the verb, which functions as a (post-verbal) subject. In these constructions, I see no reason to postulate a pre-verbal pro. It cannot be a backgrounding Pro, in line with the argumentation constructed above. In fact, there is a clear interpretive contrast between (119), in which no overt pronoun is found and no foregrounding interpretation is available, and (120), in which the backgrounding interpretation is obligatory (from Fassi Fehri (1988a, 1993)):

- (120) *ʔa huwa mustaḥiil-un ʔan n-attaʔiq-a ʔawm-an*  
 Q he impossible that we-agree-ACC day-ACC  
 “Is it impossible for us to agree some day?”

Once such constructions are taken into account, we can conclude safely that Arabic has no covert expletives. Overt expletives, on the other hand, are typically found in topic (backgrounding) positions.<sup>25</sup> The conclusion reached here is in fact compatible with the general view I adopted, namely that in NSL, T is strongly personal (or referential). If Pers in T is strong, then there could be no expletive subject, because it lacks Pers, a situation that would leave the Pers feature on T unvalued. If so, we can establish the following statement:

- (121) Consistent NSL have no subject expletives.

25. Benmamoun (1998) claims that *hunaaka* in sentences like (i), which he takes to be existential, is an expletive like ‘there’ in English:

- (i) *kaana hunaaka tʔaalib-un fii l-ḥadiiqati*  
 was there student in the-garden  
 “There was a student in the garden”.

In this reading, the expletive must follow the auxiliary, and it is (assumed to be) merged in SpecIP/TP, whereas the auxiliary is higher (in a Foc head). Unfortunately, such sentences are essentially locative, due to the presence of *hunaaka*. Pure existential clauses have no *hunaaka* there, and the thematic subject is rather post-posed as in (ii):

- (ii) *kaana fii l-ḥadiiqati tʔaalib-un*  
 was in the-garden student  
 “There was a student in the garden”.

Since there is no context in which the occurrence of *hunaaka* is dictated by structure (interfacing with either PF or LF), or by EPP, I see so reason to analyze it as an expletive rather than a normal locative. A wider comparison of the limited use of *hunaaka*, which is always semantically interpreted, compared to the more extensive (rather formal) use of ‘there’ provides further motivation for its non-expletive status. This is also corroborated by the fact that Arabic has no counterpart to structures like English (72), in addition to the non-relevance of DR, as already pointed out.

We are then left with the only option of (overt) topic expletives, which are licensed either formally or informationally, as we have seen.<sup>26</sup>

### 2.5.2 Pronouns and EPP

As widely reported in the literature (see e.g. Fassi Fehri (1993), Mohammad (2000), Harbert & Bahloul (2002)), topic expletives are incompatible with personal pronouns. This is true in active as well as passive constructions:

(122) \**zinna-hu qtanas-tu*  
that-it convinced-I

(123) *zinna-nii qtanas-tu*  
that-me convinced-I  
‘I became convinced’.

(124) \**zinna-hu sa-t-u-qtal-uu-na*  
that-it FUT-2-PASS-kill-PL-indic

(125) *zinna-kum sa-t-u-qtal-uu-na*  
that-you.PL FUT-2-PASS-kill-PL-indic  
‘Indeed, you will be killed’.

With impersonal passives, the topic expletive cannot antecede the implicit agent:

(126) *zinna-hu yurrira bi-naa*  
that-it betrayed.PASS with-us  
‘We were betrayed’.

This suggests that the indefinite person subject cannot check EPP. The situation is unlike that of the referential pro, which checks EPP, hence suggesting that the latter is high in the structure (in Spec of T, and complement of C). We can then establish the following descriptive statement:

(127) Personal pronouns are licensed in Spec T (as complements of C).

26. Fassi Fehri (1988a) presents a precursory analysis in which he assumes the existence of pro expletive subjects and topics. He takes the structure of (118) to be strictly parallel to that of the embedded CP in (122), but see Fassi Fehri (1993) for a criticism. See also McCloskey (1996) for arguments that ‘inverted’ orders in Irish (which also lack DR effects) do not involve expletives. Mohammad (2000) maintains that Spec TP projects in Arabic VS sentences like (118), with an expletive pro located there, and that the parallel structure in (122), where a complementizer must be followed by an expletive, provides ‘direct evidence’ for this claim. He also maintains that the expletive hypothesis is behind the ‘poor’ agreement patterns found in VSO structures. Unfortunately, any evidence for a silent expletive is lacking, as I explained above. See Alexiadou & Agnostopoulou (1998) for further general objections to such a kind of approach for other verb initial structures.

Likewise, expletives are licensed only in contexts in which no Pers is present on T, in conformity with the following statement:<sup>27</sup>

(128) Expletives agree with C only when T has no Person.

The two statements are applicable to a consistent NSL like Arabic, but not to a partial NSL like Finnish. In the latter, expletives are incompatible with personal subject pronouns only in some configurations (see Holmberg 2007 for detail).

### 2.6 A new approach to Voice

I have sketched a new approach to Voice, based on the scale of strength/weakness of Pers, rather than any form of Case absorption:

- (129) a. Passive is a Person (under)specification for Voi.  
b. Impersonal passive Voi agrees with a [ØPers] pro.

Impersonal passive Voi probes for a pro subject, which is deficient. Its specification is vague/indefinite, and pro has to be indefinite or vague, or more precisely [ØPers]. Two Person specifications are found on the two temporal heads, C/T and Voice/v. The passive/active alternation found in consistent NSL turns out to be natural. Once (active) T/C is specified as strongly personal, there can be no room for pro uses which are less specified. The only option left is then the use of a form of passive voice, the salient property of which is the subject person deficiency. Silent pronouns may arise through incorporation into inflection via Agree/Move. Two heads emerge as natural probes: T/C and v/Voice, the phase heads. A deficient pronominal (or pro) ‘incorporates’ into these heads, depending on its content. Pro incorporating into T/C has a specific Person value (a ‘definite’ Person), but pro incorporating into v/Voice has an ‘indefinite’ general Person. Passive voice is typically viewed as a deficiency/decline of the subject Person value, which is sharper with personal than impersonal configurations. In ‘personal’ passive, Voi does not Agree with the pro subject. The object argument can then advance to Agree with T. Comparison with Finnish, Italian, Hebrew, Irish, and French has been brought up to shed light on the nature of variation involved.

27. According to Alexiadou & Anagnostopoulou (1998), VSO languages have the property that pronominal subjects can always be dropped, and these languages have no overt expletive subjects. They ‘... satisfy EPP via verb raising because they have verbal agreement morphology with the categorical status of a pronominal element’. ‘From this it follows that: (i) preverbal subjects are not in an A-position, and (ii) VSO orders never involve a covert expletive’ (p. 494). Moreover, in some VSO type languages like Arabic and Celtic, subjects are in Spec TP, external to VP. Typology then depends on an EPP/AGR parameter and a Spec TP parameter. VSO types lack Spec AGR. See Fassi Fehri (1998) for more detail.

The approach adopted provides new ways to tackle the mixed behaviour of some voices, like the impersonal passive, which involves a demotion/decline of the person subject, but no promotion of the object. I have associated the impersonal passive with a topical Voice, and the personal passive with a non-topical Voice. Such an alternation in Agree orientation is widely documented cross-linguistically, and it has been the focus of a very recent illuminating study by Baker (2008).<sup>28</sup> The approach adopted also makes predictions about the lack of silent expletives in consistent NSL.<sup>29</sup>

### 3. Reciprocity

So far, reciprocal constructions in Arabic have been hardly described. Fassi Fehri (1986) deals partially with morphological and syntactic reciprocal alternations, Benmamoun (2003) with the morphological plurality of reciprocals, but more recently, Fassi Fehri (2009, to appear) investigates in more depth what is behind morphological and syntactic reciprocity distinctions. It is shown that reciprocal constructions (= RC) exhibit a plurality behavior in various ways. Reciprocity involves symmetric predication as well as subject/antecedent plurality, which may be discontinuous. Reciprocals are also three-way hierarchized: (a) as lexical/basic, (b) morphologically complex, or (c) syntactic, depending on their morpho-syntax and semantics. Lexical reciprocals (LR) are found in English, but are hardly instantiated in Arabic. Reciprocal expressions or pronouns (RE) appear freely with basic root verbs, to form syntactic reciprocals (SR). Morphological reciprocals (MR) forbid the occurrence of RE, at least when they are arguments.

28. Baker (2008) argues in particular for a generalization in natural languages he names SCOPA, the Structural Condition on Person Agreement, which is stated in (i):

i. F can agree with XP in +1 or +2 only if a projection of F merges with a +1 or +2 element and F projects.

The salient property of SCOPA is that it distinctively makes the valuation of Person dependent on an 'upward' controller, basically a Spec, whereas other forms of agreement are licensed 'downward', i.e. have a Comp as their controller. My topic feature comes close to SCOPA, although a detailed comparison of the two approaches will not be attempted here. Note that SCOPA is true of any Pers specification, including 3 and  $\emptyset$ .

29. If only [+Pers] Pros are licensed in Spec T/C, as I argued, and only [ $\emptyset$  Pers] pros in Spec Voi, then an 'argumental' or A expletive has no place in this system, in conformity with (131). Topic expletives are (normally) found in A' positions, and whatever structure can be proposed for foregrounding expressions. What license their occurrence is more a discourse/informational structure than inflectional structure.

RE vary depending on whether they are argumental, comitative, or modifier. Plural agreement on verbs play a role in interpreting reciprocity, but RE do not always require an antecedent which is both semantically and syntactically plural. That is, subjects of RC are semantically plural, but they may or may not be syntactically plural.

#### 3.1 Symmetric events

Symmetric predication is prototypical in expressing reciprocity. A two-place predicate is symmetric if exchanging its two arguments always preserves truth values. Thus *x met y* is symmetric, by *x saw y* is not, although RC are felicitous with either one:

- (130) a. The boys met (each other).  
b. The boys saw each other.

In the case where there can be no event of John meeting Bill without that *same* event of Bill meeting John, we can talk about *irreducibly symmetric predicates* in the sense of Dimitriadis (2008, p. 378, adjusted):

- (131) A predicate P is irreducibly symmetric if  
a. P express a binary relationship, and  
b. P's (binary) arguments have identical participation in the event described by P.

In fact, reciprocity can be true of members of a set A if the following R relations hold:

- (132) a.  $aRb \leftrightarrow bRa$   
b.  $x \neq y$

(*a* and *b* members of A, *x* and *y* variables, A a subset of the domain D of individuals).<sup>30</sup>

Konig and Kokutani (2006) provide the following list of what they take to be basic symmetric predicates in English:

- (133) meet, differ, agree with, argue with, make love to, marry, dance with, adjoin, fight with, date, resemble, join, compete with, speak with, separate y from z, etc.

30. See Buring (2007), among others.

In Fassi Fehri (2008, to appear), I have provided a parallel list of Arabic counterparts:

- (134) laqija (ltaqaa bi) 'meet', xtalafa 'differ', t-tafaqa maša 'agree with', nakaḥa, 'make love with, marry', tazawwaḡa 'marry', raqāša maša 'dance with', laḥiqa bi 'adjoin', naazaša/tanaazaša 'compete with', faabaha/tafaabaha 'resemble', tahaddaḥa ḡilaa 'speak with', fašala šan 'separate from', etc.<sup>31</sup>

What is striking, though, is that when we try to establish the Arabic counterparts of English basic reciprocals, as I did in (144), it appears that there are no Arabic basic verbs expressing directly a reciprocal action. For example, *meet*, *hug*, *resemble* have no Arabic basic counterparts, which are reciprocal. The forms used are rather derived, by adding some reciprocal morphology to roots:

- (135) *l-ta-qaq l-walad-aani*  
met-rec the-child-dual  
"The two children met each other".
- (136) *ta-šaanaqa l-faaḡizuuna*  
rec-hug the-winners  
"The winners hugged each other".

Most often, reciprocity is expressed by Form VI of the verb (t-aCaaCaCa), but also by Form VIII (CtaCaCa). Both forms have the reflexive/reciprocal [-t], as a prefix in the first case, and an infix in the second case. In the case of Form VI, however, it looks as if reciprocity is a composition of pluractionality and reflexivity. But in every case, a morphological marker is normally needed on the verb, to express reciprocity. The [-t] morpheme, which is necessary, is a reflexive/reciprocal (in addition to other functions, such as anti-causativizer).

31. It is also possible to regard verbs in (i) as instances of symmetric predicates, since they are prototypically used in symmetric situations, although their basic use may denote a certain asymmetry of power, control, initiative or involvement:

- i. kiss, embrace, divorce, greet, hug, split up with, share y with z, collide with, etc.

The Arabic counterparts are those in (ii):

- ii. qabbala 'kiss', šaanaqa/tašaanaqa 'hug', ḡallaqa 'divorce', taqaasama/qaasama 'share with', faat'ara 'split up with', baadala/taaadala 'exchange', štaraka fii 'share x with y', xtalat'a 'mix', s'aafaha/tas'aafaha 'shake hands', xaas'ama/taxaas'ama 'quarrel, dispute with', tabaaraa 'to compete with', faaxara/tafaaxara 'to pride/glory with', tabaahaḥa 'to investigate with',

### 3.2 Morphological reciprocals

The subject of the MR verb must be plural (a plural DP, or a conjunct of singular DPs):

- (137) a. *ta-xaas'ama r-rizaaalu*  
rec-disputed the-men  
"The men quarreled with each other".
- b. *ta-xaasama zayd-un wa-samr-un*  
rec-disputed Zayd and-Amr  
"Zayd and Amr quarreled with each other".

It cannot be singular:

- (138) *\*ta-xaas'ama zayd-un*  
rec-quarreled Zayd-NOM  
A 'comitative' phrase can also be used to 'pluralize' the subject:
- (139) *ta-xaasama zayd-un maša samr-in*  
rec-disputed Zayd with Amr  
"Zayd and Amr quarreled with each other".

In fact, the subject here might be taken to be a discontinuous constituent, which associates the nominative phrase and the comitative expression. I return to properties of the latter construction in subsection 3.3. on discontinuity. Note that in all these cases, the verb is not syntactically plural, and it has no plural agreement marker.

With MR, the verb is normally detransitivized and, consequently, RE cannot occur in a case-marked argument position (such as accusative object position). Compare (140) and (141):

- (140) *\*ta-xaas'ama r-rizaaal-u bašd'u-hum bašd'-an*  
ref-quarreled the-men-NOM some-NOM-their some-ACC  
Intended to mean: "The men quarrelled with each other".
- (141) *xaasama r-rizaaal-u bašd'u-hum maša bašd'-an*  
quarreled the-men-NOM some-NOM-their with some-ACC  
"The men quarreled with each other".

But an RE is not totally excluded with a MR. It can occur, for example, as a discontinuous constituent:

- (142) *ta-xaas'ama r-rizaaal-u bašd'u-hum maša bašd'-in*  
rec-quarreled the-men-NOM some-NOM-their with some-GEN  
"The men quarreled with each other".

The RE here might be taken to be a modifier of the subject, rather than argument of the verb. In (141), the RC involves Form III, which is not symmetrically reciprocal per se, although, in some cases, it expresses a sort of partnership (or commitment) of both the Subject and the Object in performing the role of Agent of the action. This shared participation or partnership may imply also a competition (or dispute) in performing the action (termed *mughaalab-ah* by traditional grammar), which is present in the interpretation of the following constructions:

- (143) a. *raaqas<sup>f</sup>-a-hu*  
danced.PL-he-him  
“He shared/competed in dancing with him”.
- b. *maazah<sup>h</sup>-a-hu*  
joked.PL-he-him  
“He shared/competed in joking with him”.
- c. *faatam-a-hu*  
gossiped.PL-he-him  
“He gossiped (competed in gossiping) with him”.

Although the vowel lengthening [aa] involved in the form does not always have this kind of interpretation (and it is rather polysemous), it is reasonable to think that its interpretation in the relevant cases is due to the fact that the event is collectively or distributively performed by a distributive plural agent, which surfaces in two argument positions, as subject and object, hence the transitivity. Suppose then that [aa] on the verb root expresses (distributive) Pl, then Zayd and Amr in (148b) should be taken as two members of the subject set (which is a non-atomic sum). But the set role is split in subject and object positions, presumably to comply with the distributive interpretation (see Fassi Fehri (2000, 2003) on distributed transitivity).

Turning now to the reciprocal/reflexive VIth Form, in which [t] is reciprocal/reflexive, and [aa] is plural, there is a sense, at least in some core cases, that the reciprocity is morphologically compositional. It associates plurality (or distributivity) and reciprocity/reflexivity (a form of symmetry). This appears to be true in the following instances:

- (144) a. *ta-raaqas<sup>f</sup>-aa*  
rec-danced.PL-dual  
“They shared dancing with each other”.
- b. *ta-maazah<sup>h</sup>-aa*  
rec-joked.PL-dual  
“They shared joking with each other”.
- c. *ta-naat<sup>f</sup>ah<sup>h</sup>-aa*  
rec-butted.PL-dual  
“They butted at each other”.

Note finally that distinctness of members within the A set, stated in (56b), is necessary to distinguish reflexive from reciprocal readings.<sup>32</sup>

Dimitriadis (2008) has argued that the comitative/discontinuous phrase, such as that found in the RE of (143), is possible only with predicates denoting irreducibly symmetric events. The discontinuous phrase can, in fact, be contrasted with a true comitative *with* phrase, which is added rather freely to sentences, as in (145):

- (145) *zakal-tu masa zajd-in*  
ate-I with Zayd-GEN  
“I ate with Zayd”.

But there are important distinctions between the comitative phrase and the discontinuous one. For example, the comitative phrase can be freely dropped, while the discontinuous phrase does not allow omission. Second, while the comitative phrase is an adjunct, the discontinuous phrase is in some sense, an argument, whose participation in the event is on par with that of the syntactic subject. The analysis of the properties of the comitative partner is beyond the scope of this study, but I will take it as an important property of the RE, which contributes to its plurality. I leave its exact syntax for further study (see e.g. Siloni (2008) and the references cited there for discussion and elaboration).

### 3.4 Syntactic reciprocals

SR exhibit various properties which set them apart from MR and LR. Contrary to the latter, it can be argued that (a) their event is normally non-symmetric (or weakly symmetric), (b) they do not admit a comitative phrase as their subject,

32. This suggests that the two morphological components available are to be interpreted as ‘distributor’ for the plural [aa], and ‘reciprocator’ (like ‘other’ in ‘each other’) for [t], rather than reflexive. Faller (2007), for example, analyses the compositionality of reciprocals along the above lines, illustrated by examples like (i), the counterpart of which is the Arabic (ii):

- (i) *hajt'a-na-ku-n-ku* (Cuzco Quechua)  
kick-PL-ref.3-PL  
“They kick each other”.
- (ii) *ta-x-aa-s<sup>f</sup>ama zajd-un wa-samr-un* (Arabic)  
ref.-PL-quarrelled Zayd-NOM and-Amr-NOM  
“Zayd and Amr quarreled with each other”.

See subsection 3.4. below for an analysis of MR along SR, involving a reciprocator component, along the lines of Heim, Lasnik, and May (1991).

(c) their RE occupies an argument position, in addition to the fact that (d) RC is necessarily transitive, (e) its subject must be plural, and (f) reciprocity is not marked on the verb, but rather on the arguments. Finally, (g) verbal Number must be plural in some cases. A simplified syntactic structure of SR is proposed (inspired by Heim, Lasnik, and May (1991)'s analysis), and compared to that of MR.

Consider an instance of SR like (146), with another form of RE, compared to a MR like (147):

(146) *xaas<sup>s</sup>ama r-rizaal-u kull-u-n l-zaaxar-a*  
 quarreled the-men-NOM each-NOM the-other-ACC  
 "The men quarreled with each other".

- (147) a. *ta-xaasama r-rizaal-u*  
 rec-quarreled the-men-NOM  
 "The men quarreled with each other".  
 b. *ta-naataha l-kabf-aani*  
 rec-butted the-sheep-dual  
 "The two sheep butted at each other".

In the SR, the subject is plural, the verb is singular, and the RE bears two distinct cases, a nominative and an accusative. The grammatical tradition thinks of the first member of RE as a 'substitute' modifier (of the subject), whereas the second is the object. Let us adopt this modifier/argument view of the two RE members. In the spirit of Heim, Lasnik, and May (1991), I take the modifier to be a distributor, and the argument to be a reciprocator. The subject DP, which is plural, represents the group/collective antecedent (to which the distributor is attached as a modifier). Finally, the verb (which is lexically, or even morphologically, plural) does not play an important role in expressing reciprocity. A simple representation is given here:

(148)  $TP/vp$ [*xaas<sup>s</sup>ama* [<sub>group</sub>[*r-rizaal-u*]<sub>distributor</sub>][*kull-u-n*]] [<sub>reciprocator</sub>][*l-zaaxar-a*]

Clearly, the verb in such constructions is non-symmetric. In a sentence like

(149) *xaas<sup>s</sup>ama zajd-un samr-an thalaaθ-a marraat-in*  
 quarreled Zayd-NOM Amr-ACC three-ACC times-GEN  
 "Zayd and Amr quarreled with each other".

Zayd may have quarreled with Amr, but Amr may not have quarrelled. But more importantly, it can be shown that the verb in MR like (151) must be symmetric, whereas it may be non-symmetric in SR like (150). In the latter, the number of disputing events may vary from 3 symmetric events of disputing to 6 non-symmetric events, each of which performed separately by each participant. In the case of MR, however, the interpretation is limited to three symmetric events:

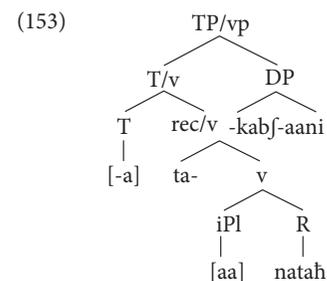
(150) *xaas<sup>s</sup>ama zajd-un wa-samr-un kull-un l-zaaxar-a*  
 quarreled Zayd-NOM and-Amr-NOM each-NOM the-other-ACC  
*thalaaθ-a marraat-in*  
 three-ACC times-GEN  
 "Zayd and Amr quarreled with each other three times".

(151) *ta-xaasama zajd-un wa-samr-un thalaaθ-a marraat-in*  
 rec-quarreled Zayd-NOM and-Amr-NOM three-ACC times-GEN  
 "Zayd and Amr quarreled with each other three times".

The event been non-symmetric in (149), it is expected that the verb would not admit a comitative/discontinuous phrase as its subject. Contrast (150) with (152):

(152) \**xaas<sup>s</sup>ama r-rizaalu l-waahid-u masa l-zaaxar-i*  
 quarreled the-men-NOM the-one-NOM with the-other-GEN

As pointed out earlier, the discontinuous construction is possible only with predicates denoting irreducibly symmetric events. I have proposed (148) above as a structure for SR. Suppose now that MR structure (for (147b)) is as follows:



In this structure, [aa] is a plural distributor acting as a modifier of vp, [t] is a reciprocator acting as a head (and having v/vp as its complement), hence 'reciprocizing' the vp. In this structure, the reciprocated event is what is relevant for the counting of the number of times the event occurred. The event is a 'group' or a 'collective' event (with a collective/group agent). In the RC (149), by contrast, the event can be distributive with respect to the two roles, as well as collective.

It is striking that the Arabic counterparts of English verbs like *meet* have various forms, which are taken to be equivalent in traditional dictionaries, although they are not total synonyms. Potentially, all of them can be symmetric, hence their apparent equivalence. But clearly, *laqiya*, *ltaqaa*, *laaqaa*, *talaaqaa* can be contrasted by taking into account their morpho-semantic composition. Only *ltaqaa* and *talaaqaa* can be truly symmetric reciprocals (by virtue of their reciprocal [t]

affix), and only *laaqaa* and *talaaqaa* share the interpretations of morphologically pluralized verbs (by virtue of their long vowel plural affix).

#### 4. Conclusion

In this contribution, I have re-examined various grammatical phenomena, including Arabic verb subject agreement asymmetries, subject pronoun deficiency (or 'Pro drop'), and reciprocal (morphological and syntactic) distinctions, which have been analyzed so far as essentially formal. I have shown that they are better treated by taking into account their semantic import. Such a new treatment is naturally framed in minimalist terms.

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## Mood feature as case licenser in Modern Standard Arabic

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Starting from the *Government and Binding Theory* until the *Minimalist Program*, it is assumed that structural case (i.e. nominative and accusative case) is assigned to an NP argument through its structural relation with a case assigner. Nominative case is assigned by the finite inflection or is licensed by the phi-features of Tense, whereas accusative case is assigned by the selecting verb. This paper argues from the observation of complementizers in Modern Standard Arabic that structural case is licensed by the mood feature that originates in the complementizer, instead of by the tense feature. Evidence is collected from (i) the case of complementizer agreement, (ii) the study of 'zinna and her sisters', (iii) the pronoun clitics, and (iv) the morphological correspondence between mood and case. The case-assigning capacity of the complementizer supports the recent analysis of Complementizer–Tense agreement relation, couched within the Probe-Goal theory of derivational syntax.

**Keywords:** Complementizer; Modern Standard Arabic; Mood; Structural Case; Agree

### 1. Introduction

The aim of this paper is to reconsider the basic issues of structural case assignment and moreover to defend the following thesis – structural case assignment stems from the mood features inherited in the complementizer instead of the phi-features under Tense, as evidenced by various observations in Modern Standard Arabic (MSA). Since Jean-Roger Vergnaud's letter to Noam Chomsky and Howard Lasnik (1977, republished in Vergnaud 2008), it has been widely assumed that all pronounced NPs should be assigned an abstract case, and that abstract case should be assigned structurally, as long as the NP argument stands in a particular structural relation with another category. Syntacticians use 'Case Filter' as a cover term for the abovementioned requirement for overt NPs (Chomsky 1981, 1986). For years, there have been attempts to delineate a unified approach to the syntactic relation between the case assigner and the case

assignee, and hence a more accurate description of the Case Filter with more descriptive power.<sup>1</sup> Starting from Postal 1974, and developed later on in Koopman 1992, Lasnik & Saito 1992; Chomsky 1995; Koizumi 1999, etc, structural case can be reduced to Spec–Head relation, in which nominative case is licensed at the position of Spec–AgrSP, whereas accusative case is assigned at Spec–AgrOP. Languages differ in whether this movement to Spec occurs during syntactic derivation (which causes word order variation) or only at the level of LF. The Spec–head relation became hard to define structurally in the absence of bar levels according to the *Minimalist Program* (Chomsky 1995), and it was claimed that c-command can offer a more accurate description of the Case Filter. Two major proposals suggested the formal relation between c-command and structural case assignment. The first proposal contended that the subject originates in the Spec-VP position (*VP-internal Subject Hypothesis*; Koopman & Sportiche 1988) and that the finite inflection (headed by T) c-commands the Spec-VP. Then the subject ends up at Spec-TP by A-movement (Chomsky 1995). The second proposal stems from the assumption that all clauses are contained within a CP layer.<sup>2</sup> The empty C functions as an intransitive complementizer that assigns nominative case to the subject which it c-commands (e.g. Radford 2004, 2009). The two proposals are schematized in the following:

- (1) a. **VP-internal Subject Hypothesis**  
 $[_{TP} DP_i [_T T [_{VP} t_i [_V V DP]]]]$   
 [*phi*]  
 [EPP]
- b. **CP Hypothesis**  
 $[_{CP} [_C \emptyset] [_{TP} DP [_T T [_{VP} [_V V DP]]]]]]$   
 [EPP]

1. In the *Government and Binding Theory* (GB) (Chomsky 1981, 1982), nominative case (i–a) is assigned by the finite inflection (e.g. under the inflectional head), whereas the accusative case is assigned by its selecting predicate, be it a transitive verb or a preposition (i–b). The Case Filter also extends to *Exceptional Case Marking* (ECM) in (i–c), in which the embedded subject ‘him’ followed by an infinitive ‘to’ exceptionally receives accusative case from the matrix predicate ‘believe’, though there is no thematic relation between them. It is argued that ECM is *case-driven*, i.e. the embedded subject in the absence of a ‘proper’ case assigner requires an exceptional structural case from another ‘potential’ case assigner. (Lasnik & Saito 1992; Lasnik 1995, 1998, 2008; Bošković 1997; Koizumi 1999; Radford 2004, 2009, among others):

- (i) a. He is innocent. (nominative)  
 b. John is proud of him. (accusative)  
 c. They believe him to be innocent. (ECM)
2. Cf. the *DP Hypothesis* in which NP is contained within a DP layer (Abney 1987).

One central inquiry is the identity of the formal features under particular functional categories that regulate structural case assignment. It has been typologically attested that structural case and agreement go hand in hand with each other (Boeckx 2006; Corbett 2006). In nominative–accusative languages in which the grammatical subject of transitive and intransitive verbs receive the same structural case, canonical agreement applies in the sense that the verb invariably agrees with the subject. *Exceptional Case Marking* (ECM) such as English ‘They believe *him* to be innocent’ can be described by postulating an empty transitive complementizer (e.g. between ‘believe’ and ‘him’) that assigns an accusative case to the otherwise caseless embedded subject. Another example that verifies the case–agreement relation comes from Icelandic (Sigurðsson 1992, 1996, also Radford 2004: 229). In (2a), the postverbal subject receives nominative case as long as an agreement relation is established with the tense. In the absence of an agreement (i.e. when the default third person agreement is used), the quirky dative case is used, as in (2b):

- (2) a. *Það voru lesnar fjórar bækur.*  
 there were read four.NOM.PL books.NOM.PL  
 ‘Four books were read.’
- b. *Það var skilað fjórum bókum.*  
 there was returned four.DAT.PL books.dat.PL  
 ‘Four books were returned.’

It is generally assumed that T is the locus of a set of agreement features (i.e. phi-features that include person, number and gender features). Syntacticians usually argue that case assignment stems from the agreement relation between the argument and T with respect to phi-features. The debate is recently renewed after Chomsky’s (2000, 2001, 2005) assumption that the case-assigning capacity of T actually stems from C via subcategorization. This paper looks at the relation between C and structural case assignment observed in MSA. In particular, we point out that C exhibits a variety of illocutionary force with respect to its modality. In MSA, modality can be expressed directly by the particular use of C, and moreover it is closely related to other issues such as the verbal aspect and structural case. We claim that C, instead of T, is *de facto* the locus of structural case assignment (cf. Radford 2009 for the analysis of English), and that structural case is assigned by the mood feature of C instead of the phi-features. The paper is structured as follows. Section 2 illustrates the mood system in MSA. Section 3 demonstrates the observation of complementizer agreement in MSA. Section 4 focuses on three observations that provide evidence to the major claim, i.e. *zinna* and her sisters (§ 4.1), pronoun clitics (§ 4.2), and mood–case correspondence (§ 4.3). Section 5 is the conclusion and further issues of the paper.

## 2. The mood system in Modern Standard Arabic

MSA has three major grammatical moods, i.e. *indicative*, *subjunctive*, and *jussive* (Wright 1889 [2005], Fassi Fehri 1993, Mitchell and al-Hassan 1994; Ryding 1995; Shlonsky 1997; Benmamoun 2000; Badawi et al. 2004; Hassanein 2006, among others).<sup>3</sup> There is a close relation between grammatical mood and tense/aspect exhibited in MSA, i.e. mood marking is only realized on the present tense or imperfective stem, and not on the past tense or the perfective stem (Ryding 2005: 444).<sup>4</sup>

Indicative mood is used on the predicate to indicate a fact, a necessarily true statement, presupposition, or a question.

- (3) *Indicative mood*
- a. *ta-srif-u kul-la fayz-in.*<sup>5</sup> (statement)  
She.know.indic every thing-GEN  
'She knows everything.'
- b. *li-maaḏaa tu-hibb-u-hu?* (question)  
why you-like-indic-3Sm  
'Why do you like it/him?'
- c. *ḏakar-a ṯanna l-sarab-a ṯaṯṯaw-haa ṯism-a-haa.* (report)  
mentioned-3P that the-Arabs-ACC gave-it name-3P.GEN  
'He mentioned that the Arabs gave it its name.'
- d. *qaal-a ṯinna-hu naaqash-a haada l-mawuḏuuṯ-a.* (report)  
said-3P that-3P discussed-3P this the-topic-ACC  
'He said that he discussed this topic.'

3. Wright (1898) [2005] argued that Arabic has five moods, i.e. indicative, subjunctive, jussive/conditional, imperative, and energetic. However he also claimed that the imperative can be understood as formed from the jussive by omitting the prefix of the second person singular, and they share the same characteristic vowel. The energetic mood usually denotes an intensified affirmation of action, yet the usage is only found in Classical Arabic, and is almost never found in MSA (Ryding 2005: 606)

4. It should be noticed that various modality can be used in the past tense/perfective aspect or in the future. For instance the past tense negative *lam*, or the future negative *lan*, can be followed by an imperfective stem that embeds a jussive mood.

The particular use of marking for the three moods is not crucial to the present analysis. In general, the indicative mood inflects with *Damma* (i.e. [-u]), the subjunctive mood inflects with *fatha* (i.e. [-a]), and the jussive mood inflects with *sukuun* (i.e. a syllabic boundary that signals that the corresponding consonant is a coda). For detailed discussion about the grammatical paradigms of mood, please refer to Ryding (2004: 606–633).

5. All Arabic examples are based on IPA transcriptions, which may be different from the original references.

Subjunctive mood expresses the speaker's doubt, desire or wish, or a state of affair that the speaker considers as necessary or obligatory. It also includes the expression of attitude such as volition, intent, purpose, attempting, expectation, etc. In general subjunctive mood can also be understood as part of *irrealis modality*, i.e. the expressed event is unreal or has yet happened as the speaking is talking (Givón 2001; Palmer 2001).

- (4) *Subjunctive mood*<sup>6</sup>
- a. *lan na-nsaa.*  
fut.not we-forget.SUBJ  
'We will not forget.'
- b. *li-ṯaaxuḏ-a-hu fii nuzhat-in.*  
In.order.that.I-take-him.SUBJ for walk-GEN.  
'In order to take him for a walk.'
- c. *qabil-a ṯan jaḏhab-a ?ad-an.*  
agree-3SG that 3SG-go.SUBJ tomorrow-ACC  
'He agrees to go tomorrow.'
- d. *ṯalab-tu min-ha ṯan taḏhab-a.*  
asked-1SG from-3SG that 3SG.left.SUBJ  
'I asked that she leave.'
- e. *qarrara ṯan jasiira.*  
decided-3SG that 3SG-go-SUBJ  
'He decided on going.'
- f. *kaana juriidu ṯan jaḏhaba.*  
be-PST wanted-3SG that 3SG-go-SUBJ  
'He wanted to go.'
- g. *kay na-ṯaṯidd-a li-l-imtiḥaan-i.*  
In.order. we.prepare.SUBJ for-the-exam-ACC  
'In order for us to get ready for the exam.'

6. Ryding 2004 listed the following matrix predicates that select for the subjunctive mood of the embedded clause.

*ṯahabb-a* 'to like', *ṯamkan-a* 'to be possible', *qarrar-a* 'to decide', *istaṯaaṯ-a* 'to be able', *ṯaraad-a* 'to want', *qadar-a* 'to be able', *ṯawjak-a* 'to be on the verge of', *ṯamakkan-a min* 'to be able', *ḥaawal-a* 'to try to', *qasḥad-a* 'to intend', *ja-ḥjibu* 'it is necessary', *ja-nbawii* 'it ought to be that', *ju-mkin-u* 'it is possible that', *min-a l-mumkin-i* 'it is possible that'

We also notice that languages differ in the particular assignment of grammatical moods to constructions. For instance while English yes-no questions are invariably interrogative, Spanish allows the use of subjunctive moods in yes-no questions. In those cases, all uses can only express a deontic meaning, instead of an epistemic one (Givón 2001).

- h. *li-kay ja-suud-a zilaa bilaad-i-hi.*  
 In-order 3SG.back.SUBJ to country-GEN-3SG  
 'In-order to return to his country.'
- i. *hattaa nu-drik-a şusuubat-a haađaa l-samal-i.*  
 In.order we.realize.3P difficulty-ACC this.the.work.ACC  
 'In order that we realize the difficulty of this work.'

Jussive mood is always considered as imperative or prohibitive which expresses the speaker's command, request, or an order. In MSA, it can be also be used in negatives and conditionals (though the conditional usage is much more frequent in Classical Arabic).

- (5) *Jussive mood*
- a. *şin ta-đhab-ii za-đhab-u maş-a-ki.* (conditionals)  
 If 2SG.go.F I-go-SUBJ with.ACC-2SG.F  
 'If you(f) go, I will go with you.'
- b. *lam na-şti.* (negation)  
 past.NEG 1PL-come  
 'We did not come.'
- c. *la taşrab xamran.* (prohibitive)  
 NEG drink.juss alcohol  
 'Don't drink alcohol!'
- d. *şu-ktub!* (imperative)  
 write-juss  
 '(You) write!'
- e. *şi-şra? wa ktub!* (imperative)  
 read-juss and write-juss  
 '(You) read and write!'

### 3. Complementizer agreement

Since modality encodes the speaker's attitude toward a proposition, we expect that there is an intimate relation between the matrix predicate that indicates the epistemic status of the speaker (e.g. whether the speaker considers that a particular proposition implies a possible event or an obligation on certain participants), and the grammatical mood of the embedded clause as a projection of the speaker's speech act. This results in a close matrix–embedded relation with respect to the realization of tense, aspect, modality, and moreover phrase structures. Examples (6) and (7) show that in English, the matrix predicate determines the type of phrase

structures generated by the embedded clause, whereas (8) suggests that there can be a concord of tense between the matrix and embedded clause:<sup>7</sup>

- (6) a. John told [<sub>IP</sub> Mary to leave] (infinitive manipulative)  
 b. \*John told [<sub>CP</sub> that Mary left].
- (7) a. John wondered [<sub>CP</sub> if Mary left] (interrogative)  
 b. \*John wondered [<sub>IP</sub> Mary to leave].
- (8) a. John thinks that Mary is sick  
 b. John thought that Mary was sick.

We notice the same observation about modality. The following examples show how the matrix predicate determines whether the embedded mood is indicative or subjunctive in English (9), French (10) and Italian (11):

- (9) a. John said that Mary was sick. (indicative)  
 b. I requested that John help me. (subjunctive)  
 c. It is vital that you be present at the meeting.  
 d. The manager insists that the car park be locked at night.
- (10) a. *Je pense que ce crayon est bon.* (indicative)  
 I think that this pencil is good  
 'I think that the pencil is good.'
- b. *Je doute que vous fassiez vos devoirs.* (subjunctive)  
 I doubt that you do-SUBJ your homework  
 'I doubt that you do your homework.'
- c. *Nous ne croyons pas que le monde soit rond.*  
 We NEG believe NEG that the world be-SUBJ round  
 'We don't believe that the world is round.'
- d. *Il est possible que nous allions en vacances.*  
 It is possible that we go-SUBJ on vacation  
 'It is possible that we go on vacation.'
- (11) a. *Mario dice che finisce all'una.* (indicative)  
 Mario 3SG.say that 3SG.finish.Pres at 1 o'clock  
 'Mario says that he finishes at 1 o'clock.'

7. One reviewer correctly points out that the tense concord between the matrix and embedded clause is not always strict, and that sometimes the embedded tense has further interpretational consequences. In the sentence such as 'John thought that Mary is sick,' Mary is possibly still sick at the time of utterance, and it has no tense concord with the matrix tense. See Abusch 1998 for further discussion of the semantics of tense.

- b. *Ho paura che sia troppo tardi.* (subjunctive)  
I afraid that it too late.SUBJ  
'I am afraid that it may be too late.'
- c. *Credo che lavino il cane molto spesso*  
I-think that 3PL.wash.SUBJ the dog very often  
'I think that they wash the dog very often.'
- d. *Desidero che venga con me*  
I-want that 3SG.come.SUBJ with me  
'I want him to come with me.'

MSA displays the same concord, with an additional note. Since MSA does not have a clear case of infinitives as English does, the matrix predicate always subcategorizes for an embedded CP as its complement. Comparing with the English complementizer 'that' and 'whether' in which the former must be followed by an indicative clause and the latter an interrogative clause, a similar observation can be drawn in MSA:

- (12) a. The indicative mood of the embedded clause is headed by the complementizer *ʔanna*.  
b. The subjunctive mood of the embedded clause is always accompanied by the complementizer *ʔan*.<sup>8</sup>

In general cases, the *ʔan*-subjunctive and *ʔanna*-indicative concordance relation is strict, shown in the following contrast:

- (13) a. *samist-u {ʔan/ʔanna} l-binta sa-t-usafiru ʔad-an.*  
1P-heard-SG that the-girl.ACC will-3P-travel.SG tomorrow-ACC  
'I heard that the girl will travel tomorrow.'
- b. *ʔatslub-u min-kum {ʔan/\*ʔanna} ta-fʕal-uu ʔaalika.*  
1P-ask-SG from-2P.PL that 2P-do-SG.SUBJ that  
'I ask you to do it.' (lit. I ask you that you do it.)
- c. *ʔakar-a {ʔan/ʔanna} laday-hi l-mustanadaat-i l-rasmiyyat-a.*  
mentioned-3P that to-him the-official-GEN the-documents-ACC  
'He mentioned that he has the official documents.'
- d. *ʔadrak-a ʔanna-hu nasty-a ʔsm-a-haa.*  
realized.3P that-3SG forgot.3SG name.ACC.3SG.F  
'He realized that he had forgotten her name.'

8. The following subjunctive particles can also be used: *ʔan* 'that', *lan* 'will not, never', *ʔiʔan* 'then, in that case', *ʔallaa* 'that not', *li-* 'in order to', *liʔallaa* 'in order', *kaj/li-kaj* 'so that', *kaj-laa* 'so that not', *li-ʔanna* 'because', *Hattaa* 'so that', *Hattaa laa* 'in order not to'. Note that alternatively, Benmamoun (2000, p.21) glossed *ʔan* as the infinitive 'to' and treated the embedded clause after *ʔan* nonfinite.

- e. *laa ʔa-ʔann-u ʔanna l-masrahiyaat-i kaan-at radiiʔat-an.*  
No 1P.think.SG that the-play.ACC be-pst.SG bad.ACC  
'I do not think that the plays were bad.'

A caveat is in order here. While (12) represents the concord relation between the use of complementizers and the embedded mood, optionality can be found in some cases. Wright (1889 [2005], vol. I, p. 25) pointed out that "...*ʔanna* with the indicative of the imperfect is often employed as the equivalent of *ʔan* with the subjunctive, [the transcription *ʔanna* and *ʔan* are originally in Arabic script; TL]". Sometimes, "if the verb to which *ʔan* is subordinate does not indicate any wish, effect, expectation, or the like, and the verb which is governed by *ʔan* has the meaning of the perfect or present, the perfect or the imperfect indicative is used after *ʔan*. [originally in Arabic script; TL]" (ibid, p. 26). Wright distinguished two types of *ʔan*, i.e. the 'lightened *ʔan*' that governs the indicative, and the *ʔan* that governs the subjunctive. It should be pointed out that after verbs of thinking, supposing and doubting, when they refer to the future, *ʔan* may govern the indicative of the imperfect or the subjunctive. For instance:

- (14) *ʔʔanan-tu ʔan jaquum-a.*  
1P.think.SG that 3s-will.get.up  
'I think he will get up.'

However, Wright maintained the observation that whenever the subjunctive is used within the embedded clause, the subordinating complementizer must be *ʔan* and it does not seem to be optional. In the traditional GB theory, it was generally proposed that the complementizer embeds a [ $\pm$ wh] feature that subcategorizes for a particular type of complement (i.e. a declarative or an interrogative). While we understand that the observations primarily come from English, data from other Indo-European languages and MSA indicate clearly that C embeds more than a [ $\pm$ wh] feature. We therefore make the following statement:

- (15) a. Complementizers embed a mood feature, i.e. [a mood].<sup>9</sup>  
b. The mood feature of complementizers establishes an agreement relation with the domain it governs.

(15a) is not a novel claim given that one major function of complementizers is to express the illocutionary force of the speaker. What is being argued here is that the complementizer conflates a cluster of interpretable and uninterpretable features that interact both with the matrix and the embedded domain. As a result, we can analyze complementizers as the 'syntactic concatenator' that combines syntactic

9. See for instance den Dikken 2006 for a similar concept.

domains, and moreover transfers features from one domain to another,<sup>10, 11</sup> In the case of MSA, the mood feature of C mediates between the matrix predicate and the embedded mood. In this work, we treat grammatical mood as a type of agreement features that can be realized under the Tense (T), with the following claim:

- (16) An agreement relation is established between the complementizer and Tense with respect to the mood feature.<sup>12</sup>

To schematize such an agreement relation and the role of complementizers, we summarize in three situations:

- (17) a. say/hear/report<sub>[+indicative]</sub> ... [CP C<sub>[+indicative]</sub> [TP T<sub>[+indicative]</sub> ...]]  
 b. wish/request/suggest<sub>[+subjunctive]</sub> ... [CP C<sub>[+subjunctive]</sub> [TP T<sub>[+subjunctive]</sub> ...]]  
 c. ... order/warn<sub>[+imperative]</sub> ... [CP C<sub>[+imperative]</sub> [TP T<sub>[+imperative]</sub> ...]]

To sum up, C functions as a formal connective between the matrix and embedded domain, such that the particular mood feature projected in the matrix domain can be transferred to the embedded domain. The transfer process is proved by the observation of C-agreement, in which different Cs are used when different types of mood are projected, i.e. (12). C-agreement is widely attested. Another salient example that illustrates C-agreement comes from West Flemish (Haegeman 1992; Corbett 2006). This language exhibits an example of ‘double complementizer agreement’, i.e. C (e.g. *dan-k* vs. *da-j* vs. *da-n*) agrees with the embedded subjects with respect to the phi-features of the embedded subject, and it also agrees with the verbal suffix:

- (18) a. *K-peinzen dan-k ik morgen goa-n*  
 I.think that.1SG I tomorrow go  
 ‘I think that I’ll go tomorrow.’  
 b. *K-peinzen da-j gie MORGEN goa-t.*  
 I.think that.2SG you tomorrow go  
 ‘I think that you will go tomorrow.’

10. This also underlies the concept of ‘phase’ in Chomsky 2000, 2001, 2005, i.e. the *Phase Impenetrability Condition* (PIC), in which the domain of a head of a strong phase (e.g. CP or vP) is not accessible to operations at its next strong phase. The only exception to PIC is the phase head (i.e. C, v) and the phase edge (i.e. Spec-CP and Spec-vP).

11. The current thesis is independent of (though not in conflict with) the *Split-CP Hypothesis* (Rizzi 1997, 2001) that argued that the CP should be split into layers of functional projections such as ForceP, FinP and TopP. See Radford (2004:253–62, 2009:324–38) for detailed discussion.

12. Chomsky 2000, 2001, Pesetsky & Torrego 2001, 2004; Ouali 2008; Roussou 2009.

- c. *K-peinzen da-n Valère en Pol morgen goa-n.*  
 I.think that.3pl Valère and Pol tomorrow go  
 ‘I think that Valère and Pol will go tomorrow.’

Another example comes from Modern Greek (Roussou 2009). Modern Greek has two complementizers, *oti* and *pu* (both meaning ‘that’), that select a declarative complement. Their distinction is shown by whether the matrix predicate subcategorizes for a factive or a non-factive complement, i.e. *pu* is factive, whereas *oti* is not.

- (19) a. *Xerome pu/\*oti o Janis elise to provlima.*  
 am-glad that the John solved-3s the problem  
 ‘I am glad that John solved the problem.’  
 b. *Pistevo oti elise to provlima.*  
 believe-1s that solved-3s the problem  
 ‘I believe that he solved the problem.’

The widely attested observation of C-agreement couples with *Derivation by Phase* (Chomsky 2000, 2001, 2005, Frampton et al. 2000) with respect to the *Agreement-and-Valuation* process. This can be summarized in the following claim:

- (20) C–T agreement values the mood and tense features of the embedded T.<sup>13</sup>  
 Let us look at the following mechanism of feature valuation.<sup>14</sup>

- (21) Stage One

|                    |                |                   |                   |                    |                |                                    |
|--------------------|----------------|-------------------|-------------------|--------------------|----------------|------------------------------------|
| [ <sub>TP</sub> DP | T <sub>1</sub> | [ <sub>VP</sub> V | [ <sub>CP</sub> C | [ <sub>TP</sub> DP | T <sub>2</sub> | [ <sub>VP</sub> [ <sub>VP</sub> V] |
|                    | [α-mood]       |                   | [ω mood]          |                    | [0 mood]       |                                    |
| [β-phi]            | [β-phi]        |                   | [0 phi]           | [x phi]            | [0 phi]        |                                    |
|                    | [γ tns]        |                   | [0 tns]           |                    | [ψ tns]        |                                    |

Stage Two:

|                    |                |                   |                   |                    |                |                                    |
|--------------------|----------------|-------------------|-------------------|--------------------|----------------|------------------------------------|
| [ <sub>TP</sub> DP | T <sub>1</sub> | [ <sub>VP</sub> V | [ <sub>CP</sub> C | [ <sub>TP</sub> DP | T <sub>2</sub> | [ <sub>VP</sub> [ <sub>VP</sub> V] |
|                    | [α-mood]       |                   | [ω mood]          |                    | [0 mood]       |                                    |
| [β-phi]            | [β-phi]        |                   | [x phi]           | [x phi]            | [0 phi]        |                                    |
|                    | [γ tns]        |                   | [0 tns]           |                    | [ψ tns]        |                                    |

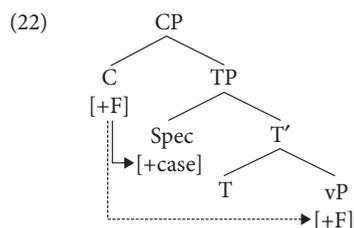
Stage Three:

|                    |                |                   |                   |                    |                |                                    |
|--------------------|----------------|-------------------|-------------------|--------------------|----------------|------------------------------------|
| [ <sub>TP</sub> DP | T <sub>1</sub> | [ <sub>VP</sub> V | [ <sub>CP</sub> C | [ <sub>TP</sub> DP | T <sub>2</sub> | [ <sub>VP</sub> [ <sub>VP</sub> V] |
|                    | [α-mood]       |                   | [ω mood]          |                    | [0 mood]       |                                    |
| [β-phi]            | [β-phi]        |                   | [x phi]           | [x phi]            | [x phi]        |                                    |
|                    | [γ tns]        |                   | [ψ tns]           |                    | [ψ tns]        |                                    |

13. See Rizzi 1990; Collins 1997, 2002, Frampton et al. 2000; Chomsky 2001, Pesetsky & Torrego 2001, 2004, among many others, for related discussion.

14. The three stages of derivations are only for clarification purpose and do not have any formal status.

An agreement relation between the formal features is established as long as the derivation is ongoing. We tentatively assume the *Probe-Goal* approach to derivation in which the Probe searches for a corresponding Goal for feature agreement and valuation, and the Probe–Goal relation satisfies some structural conditions (e.g. c-command, minimality, etc). At stage one, we assume that C carries [ $\omega$  mood] as an interpretable feature, whereas its phi-features and tense features are uninterpretable. The embedded  $T_2$  carries an interpretable tense feature and the uninterpretable mood and phi-features. On the other hand, for the reason of space, we assume that the matrix  $T_1$  consists of a complete set of valued features, including the phi-, tense, and mood feature. The phi- and mood feature of  $T_1$  are valued and inaccessible to computation (indicated by the strikethrough). At stage two, the unvalued phi-features of C probe for and agree with the phi-features of the embedded subject [ $x$  phi]. The tense feature of C is valued given its agreement with  $T_2$ . The agreement relation is legitimate given that the structural condition (e.g. c-command) is met. At stage three, the complete valued uninterpretable features of C (i.e. [ $\omega$  mood] and [ $x$  phi]) are transferred to the embedded  $T_2$  by means of *feature inheritance* (Chomsky 2001, 2005). The concept of feature inheritance between C and T stems from Chomsky’s reanalysis of nominative case marking, in which he claims that ‘the locus of nominative case and subject–verb agreement is C, not T’ (Chomsky 2000:35). Departing from the old consensus that T is the locus of nominative case assignment, Chomsky claimed that the case-assigning capacity of T actually stems from the subcategorization relation between C and T. To schematize the picture (see also Radford 2009 for similar proposal):



This understanding of structural case assignment makes sense in that nominative and accusative case assignment can be significantly unified, i.e. the case-assigner c-commands the case-assignee, and the minimality condition is satisfied. Be it the case, we are led to the following claims for MSA given its observation of C-agreement and itself as a nominative-accusative case language, i.e.:<sup>15</sup>

15. Soltan 2006 made a similar assumption that the complementizer *zinna* can assign an accusative case to the subject of the embedded clause, analogous to the ECM. The present

- (23) a. The complementizer assigns structural case to the subcategorized subject.  
 b. Structural case assignment involves feature inheritance, shown by the complementizer agreement with the grammatical mood.  
 c. The mood feature under the complementizer assigns structural case.

The abovementioned claims are supported by three types of observations in MSA, i.e. *zinna* and her sisters (§ 4.1), pronoun clitic (§ 4.2), and mood-case correspondence (§ 4.3).

#### 4. Further evidence

##### 4.1 *zinna* and her sisters (إن وأخواتها)

In MSA, there exists a class of connectives that functions as the subordinating or coordinating conjunctions. Arabic grammarians term this class ‘*zinna* and her sisters’ (إن وأخواتها) given their similar properties (Wright 1886 [2005], Ryding 2005; Badawi et al. 2004; Hassanein 2006, Abu-Chacra 2007). ‘*zinna* and her sisters’ consist of the following list of members:

- (24) *zinna* ‘indeed, that’, *zanna* ‘that’, (*wa*)-*lākinna* ‘but’, *li zanna* ‘because’, *kazanna* ‘as if’, *lasalla* ‘perhaps’, *layta* ‘would, if only’

One important property that is shared among all constructions formed by ‘*zinna* and her sisters’ is the observation of *accusative subjects*. While the assignment of accusative case in MSA is restricted to the object or adverbial complement of transitive verbs,<sup>16</sup> the subjects of the complement headed by ‘*zinna* and her sisters’ must be assigned accusative case even though they are embedded subjects (e.g. Ryding 2005; Badawi et al. 2004; Hassanein 2006). For instance:

- (25) a. *qaal-a zinna zahad-an laa ja-statiis-u lan ju-qqif-a-hum.*  
 said-3SG that anyone-ACC NEG 3SG-able-Pres that 3P-stop-them  
 ‘It/He said that no one could stop them.’  
 b. *zinna z-ziraasat-a luyat-un saalamijjat-un.*  
 that the-agriculture-ACC language-NOM world-NOM  
 ‘That (indeed) agriculture is a world language.’
- (26) a. *na-staqid-u zanna z-ziraasat-a lu?at-un saalamijjat-un.*  
 we-believe that the-agriculture-ACC language-NOM world-NOM  
 ‘We believe that agriculture is a world language.’

thesis differs in the type of formal features that are responsible for structural case assignment. For the discussion of ECM, see the last section of this paper.

16. The complement of prepositions is assigned genitive case.

- b. *raʔm-a ʔanna t-tiʕaahaat-in ʔiijaabijjat-an saxaḏ-at ta-nbasiq-u.*  
despite that trend-ACC positive-ACC began-F emerge  
'Despite that the positive trends began to emerge.'
- (27) *wa-laakinna l-haaṣil-a saks-u ḏaalika.*  
and-but the-actuality-ACC reverse-NOM that  
'But the actuality is the reverse of that.'
- (28) *lasalla ṣ-ṣiyaah-a ʔazʕaḏa-haa.*  
perhaps the-shouting-ACC bothered-her  
'Perhaps the shouting bothered her.'
- (29) *sa-ʔaḏhabu ʔilaa f-ʕaaṭiʔ-i li-ʔanna ʕ-ʕaqs-a ḥaarr-un.*  
will-I.go to-the-beach-ACC because the-weather-ACC hot-ACC  
'I will go to the beach because the weather is hot.'
- (30) *sabaḥa maṣa ʔanna l-maaʔ-a wasix-un.*  
3SG-swam although that the-water-ACC dirty-NOM  
'He swam although the water was dirty.'
- (31) a. *kaʔanna faxsʔ-an waahid-an qad ʔasaddaa-huna.*  
as-if person-ACC one-ACC PERF prepared-them  
'As if a single person had prepared both of them.'
- b. *kaʔanna-ha triidu ʔan txbar-nii ʕaʔ-an.*  
as-if-3SG.F want that 3S-tell-me something-ACC  
'As if she wants to tell me something.'
- c. *ʔtahadaaθ bi-ssawt-an ʕaal-an kaʔanna*  
by-voice-ACC loud-ACC as-if the-teacher-ACC  
*al-ustaḏ-a ʔayr-u 1SG-talk*  
be-not-nom mawʕud-in. exist-ACC  
'I talk loudly as if the teacher is not here.'
- (32) a. *wa-lajta l-ʔamr-a ta-waqqaf-a hunaa.*  
and-if.only the-matter-ACC 3SG-stop there  
'If only the matter would stop there.'
- b. *laasb-tu kθiir-an wa-lajta al-waqt-a jatsul.*  
played-1SG a.lot-ACC and-if.only the-time-ACC longer  
'I played a lot, if only the time were longer.'

The relation between 'ʔinna and her sisters' and the accusative subjects is not defined linearly but structurally (e.g. c-command). This is shown by the following examples in which a non-subject NP or an adverbial phrase can intervene between them:

- (33) a. *laakinna hunaaka ḥajawaanaat-in ʔuxraa.*  
but there animals-acc other  
'But there are other animals.'

- b. *ḏakar-a ʔanna laday-hi l-mustanadaat-i l-rasmijjat-a.*  
3SG-mentioned that to-him the-documents-ACC the-official-ACC  
'He mentioned that he has the official documents.'

The assignment of accusative case to embedded subjects is directly related to the particular choice of complementizers, given that nominative case is assigned to the subjects in the unmarked case (especially in the absence of 'ʔinna and her sisters'), e.g. (34) (Ryding 2005: 169). Also as shown above (e.g. 25b, 26b, 27, 28, 31a–b, 32a), 'ʔinna and her sisters' when functioning as a sentence-initial conjunction still assign accusative case to the sentential subject.

- (34) a. *ittafaq-a l-wuzaraaʔ-u ʔalaa tasziiz-i l-taʕaawun-i.*  
agreed-3P the-minster-NOM to strength the-cooperation-ACC  
'The ministers agreed to strengthen cooperation.'
- b. *ʕaqad-a l-ʔaanib-aani mubaahathaat-in rasmiyyat-an.*  
held-3P the-side-dual discussions-GEN official.ACC  
'The two sides held official discussion.'

Based on the above observations, we can safely make the following claims:

- (35) a. In Modern Standard Arabic, accusative subjects, 'ʔinna and her sisters' and grammatical mood are syntactically related.
- b. The case assignment on sentential subjects is a reflex of the mood feature of the complementizer.

To illustrate the function of the mood feature and its relation with accusative subjects, the following schemas show two cases, one formed by 'ʔinna (and her sisters), and another by ʔan. Notice the difference between the mood feature under the complementizer, and the case feature valued under the embedded subject:

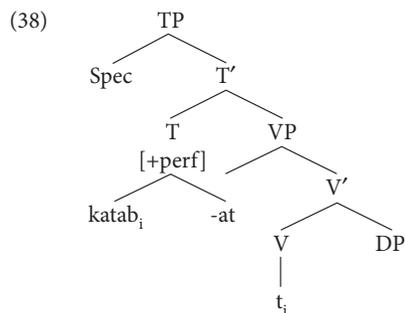
- (36) a.
- |                    |                |                   |                       |                    |                |                                        |
|--------------------|----------------|-------------------|-----------------------|--------------------|----------------|----------------------------------------|
| [ <sub>TP</sub> DP | T <sub>1</sub> | [ <sub>VP</sub> V | [ <sub>CP</sub> ʔinna | [ <sub>TP</sub> DP | T <sub>2</sub> | [ <sub>VP</sub> [ <sub>VP</sub> V]...] |
|                    | [+ indic]      |                   | [+ indic]             | [+acc]             | [+ indic]      |                                        |
| [β phi]            | [β phi]        |                   | [x phi]               | [x phi]            | [x phi]        |                                        |
|                    | [γ tns]        |                   | [ψ tns]               |                    | [ψ tns]        |                                        |
- (36) b.
- |                    |                |                   |                     |                    |                |                                        |
|--------------------|----------------|-------------------|---------------------|--------------------|----------------|----------------------------------------|
| [ <sub>TP</sub> DP | T <sub>1</sub> | [ <sub>VP</sub> V | [ <sub>CP</sub> ʔan | [ <sub>TP</sub> DP | T <sub>2</sub> | [ <sub>VP</sub> [ <sub>VP</sub> V]...] |
|                    | [+ subj]       |                   | [+ subj]            | [+nom]             | [+ subj]       |                                        |
| [β phi]            | [β phi]        |                   | [x phi]             | [x phi]            | [x phi]        |                                        |
|                    | [γ tns]        |                   | [ψ tns]             |                    | [ψ tns]        |                                        |

## 4.2 Pronoun clitics

Another piece of evidence supporting the C–T agreement in MSA comes from pronoun clitics. It is widely assumed that the particular use of pronoun clitics, whether it is a prefix or a suffix, is dependent on the verbal aspect (Wright 1886 [2005], Benmamoun 2000; Ryding 2005, among others). In the perfective, the pronoun clitic is always suffixal, whereas in the imperfective, the verb can be attached by a prefixal and a suffixal clitic. Assuming that verbal aspect is analyzed as an interpretable feature of T, we can make the following claim:

- (37) In Modern Standard Arabic, the pronoun clitic is a strong uninterpretable feature of Tense.

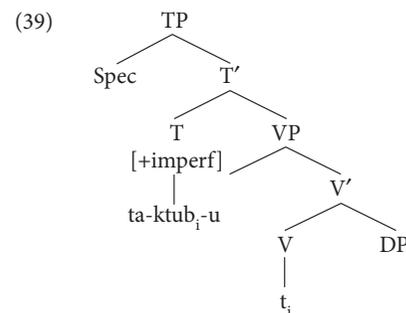
It should be pointed out that the pronoun clitic of T is distinct from T's phi-features. While the uninterpretable phi-features of T need to be valued by the corresponding phi-features of the DP under a particular structural relation (e.g. Spec–head relation), in MSA the pronoun clitic as an uninterpretable feature of T is valued by being hosted by a verbal head, otherwise its existence without a verbal host will violate certain PF conditions (e.g. the adjacency condition). The feature valuation of the pronoun clitic of T can be accomplished through verb movement to the Tense head. For instance in the formation of *katabat* 'She wrote':<sup>17</sup>



Following Benmamoun's 2000 analysis of negation in MSA and various Arabic dialects, we assume that the agreement morphology on the imperfective follows the same concept with an additional assumption that the prefixal and suffixal pronoun on the imperfective constitute a *discontinuous clitic*. For instance

17. Another piece of evidence for V-to-T movement in MSA comes from the formation of negation. See Benmamoun 2000 for more detailed discussion.

in forming the imperfective *ta-ktub-u* 'She is writing', the verbal root *ktub* 'write' moves to T and is circumfixes by the pronoun clitic *ta-* and *-u*.



C–T agreement can be further supported by the following fact in which MSA complementizers can host the pronoun clitic *-hu*:<sup>18</sup>

- (40) a. *samisa ʔanna-hu marid-un.*  
 heard-3P that-3P giant-NOM  
 'He heard that he was a giant.'
- b. *ʔinna-hu mafʔul-un.*  
 that-3P busy-NOM  
 'That (indeed) he is busy.'
- c. *samisa ʔanna-hu tusaafiru l-bintu vad-an.*  
 heard-3P that-3P will-travel the-girl tomorrow-ACC  
 'I heard that the girl will travel tomorrow.'

This offers strong defense to the claim that C overlaps with T in the set of formal features, one of which is the strong and uninterpretable [+D] feature that attracts cliticization and verb movement.

## 4.3 Mood-Case correspondence

The last major evidence supporting the claim that the mood feature of C assigns structural case comes from the morphological correspondence between grammatical mood and case in MSA. They overlap in the use of markers. In general, indicative mood is morphologically related to nominative case. On the other

18. The pronoun clitic *-hu* is argued to function as the generic buffer pronoun that is independent of the subject of the embedded clause (Ryding 2005). This is analogous to English 'that' which incorporates a [+D] feature (i.e. it refers to the embedded clause).

hand, the subjunctive marker is formed by changing the indicative vowel *-u* to *-a*, the accusative marker (even though the correspondence between subjunctive mood and accusative case is less transparent than that between indicative mood and nominative case):<sup>19</sup>

- (41) a. *t<sup>ʕ</sup>-t<sup>ʕ</sup>aalib-u* ‘the-student-nom’ (nominative case)  
 b. *t<sup>ʕ</sup>-t<sup>ʕ</sup>aalib-aan* ‘the-student-dual-NOM’  
 c. *l-muʕallim-uun* ‘the-teacher-PL.NOM’
- (42) a. *t<sup>ʕ</sup>-t<sup>ʕ</sup>aalib-a* ‘the-student-ACC’ (accusative case)  
 b. *t<sup>ʕ</sup>-t<sup>ʕ</sup>aalib-ayn* ‘the-student-dual-ACC’  
 c. *l-muʕallim-iin* ‘the-teacher-PL.ACC’
- (43) a. *ja-ktub-u* ‘3m-write-ind’ (indicative mood)  
 b. *ja-ktub-aan* ‘3m-write-dual.ind’  
 c. *ja-ʕallim-uun* ‘3m-teach-PL.ind’
- (44) a. *ja-ʕrif-a* ‘3m-know-subj’ (subjunctive mood)  
 b. *ja-ʕrif-aa* ‘3m-know-dual.SUBJ’  
 c. *ja-ʕrif-uu* ‘3m-know-PL.SUBJ’

## 5. Conclusion and further issues

This paper starts with the discussion of the mood system in Modern Standard Arabic (MSA) and concludes with some theoretical claims about structural case assignment and the formal features of complementizers. We look at the observation of complementizer agreement that is regulated by the particular mood of the embedded clause. Assuming that mood is an uninterpretable feature under Tense, we claim that complementizer agreement discloses a clear case of C–T agreement, a special type of agreement relation that was brought up in Chomsky 2000, 2001, and 2005. According to Chomsky, the set of formal features of T (e.g. phi-features) and its syntactic function (e.g. structural case assignment) stems from feature inheritance. The complementizer subcategorizes for T and moreover transfers its complete set of formal features to T. As a result, we conclude that the structural case assigning capacity of T actually derives from C. There are several merits for this shift. First, structural case assignment (i.e. nominative and accusative case) can be largely unified, for instance under the *c*-command condition and subcategorization that are arguably pivotal in *Derivation by Phase* (Chomsky 2000). Second, it immediately describes the observation of *prepositional complementizers*,

19. Benmamoun (2000:59–61, originated in Gray 1934) also pointed out the morphological correspondence between pronoun and person suffix agreement.

such as English ‘for’ in *Exceptional Case Marking* (ECM) (Lasnik & Saito 1992; Lasnik 1995, 1998, 2008; Bošković 1997; Radford 2004, 2009):

- (45) a. It is vital for him to study hard.  
 b. For him to resign would cause chaos.

The claim that C assigns structural case to the embedded subject extends to other constructions. Radford (2009:117) considers (46a) as an example of ECM by positing a null C (c.f. ‘for’). The coordination example in (46b) further shows that the left conjunct is a CP with a null (or deleted) C:

- (46) a. She wanted ~~for~~ him to apologize.  
 b. I want [for Mary to come to Japan] and [for her to see my parents].

For the sake of uniformity, Radford claims that English complementizer ‘that’ should assign nominative case to the subject of the embedded clause, e.g. (cf. 22):

- (47) He may suspect (that) she is lying.

Here, we see a close relation between finiteness and structural case in English, summarized in the following claim (cf. Radford 2009:121):

- (48) a. The intransitive finite complementizer ‘that’ assigns nominative case to a noun/pronoun which it *c*-commands.  
 b. The infinite/prepositional complementizer ‘for’ assigns accusative case to a noun/pronoun which it *c*-commands.

Again, the conclusion in English is that there is an intimate relation between finiteness (as an interpretable feature of T) and case assignment (i.e. nominative or accusative). On the other hand, Modern Standard Arabic differs from English in that the feature of T that interacts with case assignment is mood. We therefore make the following conclusion:

- (49) Structural case assignment stems from the set of formal features of the complementizer. Languages differ from the particular choice of formal features (e.g. mood, finiteness, voice, force, phi-features) that interact with structural case assignment.

Further work should at least focus on two major directions. For the study of Modern Standard Arabic, one ensuing issue is the treatment of ECM constructions (e.g. the so-called ‘*ʔanna* and her sisters’) and their relation with case assignment. For instance:

- (50) a. *ʔa-ð<sup>u</sup>unn-u ʔajd-an ðaahib-an.*  
 I-believe Zayd-ACC going-ACC  
 ‘I believe Zayd going.’

- b. *wa-na-stabir-u maktabat-a l-markaz-i muhimmat.an.*  
 and-we-consider library-ACC the-center-GEN important-ACC  
 'we consider the library of the center important.'

For the study of syntactic theory in a broad sense, it is tempting to focus more on the complete set of formal features of the complementizer, and moreover investigate the way in which these formal features are related to other syntactic functions (e.g. case assignment as pursued in this paper). It is our strong feeling that a thorough understanding of this issue can eventually provide a much more satisfactory account to some current theory of syntax, for instance the theory of *Derivation by Phase*, especially the notion of phase that leads to many other related issues such as movement and locality (Chomsky 2001). None of these problems can be solved without a good understanding of the set of formal features of the complementizer. For the reason of space, we would like to leave this to further work.

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## Extraction and deletion in Palestinian Arabic comparatives\*

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Quantity and quality adjectives have a different distribution in comparative constructions that are headed by *ma* 'that' in Palestinian Arabic. The different distribution can be explained in configurational terms: The internal structure of the DP prohibits the movement of quality adjectives but not of quantity adjectives. Movement of the quality adjectives within the DP in order to check agreement features (Chomsky 1995; Fassi Fehri 1999) and from the DP to Spec,CP (Ross 1967; Bresnan 1973; Chomsky 1977, *inter alia*) creates structures whose features do not correspond to lexical items in Palestinian, i.e. it incurs a PF violation. Deletion that removes the offending structure renders that comparative structure grammatical (Kennedy & Merchant 2000). In this study, we draw attention to the complexity of the configurational relations between the noun and adjective(s), thereby contributing to the study of the internal structure of the Arabic DP. In addition, our analysis lends support to the claim that some structural violations that have been considered purely syntactic (e.g. Left Branch Conditions) are in fact PF violations that can be remedied by deletion.

**Keywords:** Adjectives; DP; NP; Comparatives; ellipsis

### 1. Introduction

The cross-linguistic study of comparative structures helps to provide a clear picture of the diversity in the expression of comparison as well as shed light

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on the internal structure of the syntactic constituents that comparative structures are composed of in each language studied. The focus of this study is the structure of comparative constructions in Palestinian Arabic. In this dialect, comparative clauses that are headed by the complementizer *ma* 'that' exhibit a difference in the distribution of quality and quantity adjectives. We explain these distributional differences by proposing distinct internal structures for the constituents that include quantity and quality adjectives.

We assume that *ma*-comparatives involve *wh*-movement of a comparative element (DegP) to the Spec,CP of the standard clause. The *wh*-movement operation targets positions of quantity and quality attributive or predicative adjectives, specifically DegP projections. We also assume that the DegP (the phrase that contains the adjective) moves out of the NP to a functional projection in the DP in order to check agreement features, following Fassi Fehri (1999).

We propose that a configurational difference between quantity and quality adjectives leads to their distributional difference in comparatives: Quality adjectives always move out of the NP, while quantity adjectives never do. The interaction of the DP-internal movement of some adjectives and the *wh*-movement in comparatives results in ungrammatical structures in comparatives with quality adjectives. DegPs containing quality adjectives discharge a [+wh] feature to the *d* head as they move successive-cyclically to their final position at Spec,CP of the standard clause. Since there is no lexical entry corresponding to a *d* head with a [+wh] feature, the resulting structure violates the principle of FULL INTERPRETATION (Chomsky 1995, defined in Section 4.2.). DegPs containing quantity adjectives, on the other hand, do not move out of the NP but rather out of the DP, and thus do not discharge a [+wh] feature to the *d* head, avoiding the creation of a structure that would violate the Phonological Form (PF). That said, the comparative derivation involves a local (clause-bounded), optional deletion process, which can prevent the spell-out of ungrammatical structures; that is, deletion prevents PF violations.

The paper is structured as follows. We first present the distribution of quantity and quality of adjectives and follow with additional information about the structure of comparatives in Palestinian Arabic. In Section 3, we summarize the analysis of the internal structure of the Arabic DP we are adopting, and in Section 4, we propose an analysis of the difference between quantity and quality comparatives in Palestinian in terms of a configurational difference between the types of adjectives and how they affect the grammaticality of different comparative constructions. We conclude with the implications of our analysis on the internal structure of the Arabic DP as well as our understanding of the syntax–PF interface.

## 2. Comparatives in Palestinian Arabic

Palestinian Arabic utilizes two complementizers in comparative constructions: *illi* and *ma*. While *ma* requires a gap in the relativized position, as shown in (1a), *illi* requires a resumptive pronoun, as illustrated by (1b).<sup>1</sup>

- (1) a. *sased zakal baskut zaktar mi-ma zaklat \*(=o) muna*  
 Saed ate.3SM cookies more from-that ate.3SF (=it.3SM) muna  
 'Saed ate more cookies than Muna ate.'
- b. *sased zakal baskut zaktar min illi zaklat \*(=o) muna*  
 Saed ate.3SM cookies more from that ate.3SF (=it.3SM) muna  
 'Saed ate more cookies than Muna ate.'

The sentence in (1a) can be paraphrased as in (2a), in which what is compared is the number of cookies eaten. The sentence in (1b) can be paraphrased as in (2b), in which what is compared is whatever was eaten.

- (2) a. Saed ate more cookies than Muna ate.  
 b. Saed ate more cookies than what Muna ate.

Another difference between the two complementizers is that *ma* comparatives also allow subcomparatives, i.e. comparisons of a degree of two different objects or properties, as in (3), where the quantity of bananas is compared to the quantity of cookies (underlined in the examples). Subcomparatives are ungrammatical in *illi* comparatives, which is expected if subcomparatives require that only a degree (and not an individual) be involved in the comparison.<sup>2</sup>

- (3) a. *sased zakal baskut zaktar mi-ma zaklat muna moz*  
 Saed ate.3SM cookies more from-that ate.3SF muna bananas  
 'Saed ate more cookies than Muna ate bananas.'
- b. \**sased zakal baskut zaktar min illi zaklat muna moz*  
 Saed ate.3SM cookies more from that ate.3SF muna bananas  
 'Saed ate more cookies than Muna ate bananas.'

1. See Shlonsky (2002) for convincing arguments for the claim that *ma* is a complementizer. Shlonsky only discusses *ma*'s distribution as a complementizer in free relatives and constituent questions and not in comparatives.

2. Egyptian Arabic lacks the use of *ma* in comparative constructions and does not have subcomparatives. This observation provides additional evidence to the claim that *ma* targets a degree term and not an individual. The subcomparative construction in (3) can only be expressed in Egyptian Arabic by a direct comparison, along the lines of 'the number of cookies that Saed ate is greater than the number of bananas that Muna ate.' (Usama Soltan p.c.)

A third notable difference between the two complementizers is that *ma* comparatives are subject to island constraints (Ross 1967), while *illi* comparatives are not, as shown in (4), which is an example of an adjunct island. Island violations are taken to be a diagnostic for movement, and therefore *ma* may have a structure that involves movement, while *illi* does not.

- (4) a. \**musa kasr fababiik zaktar mi-ma tafadzazat*  
 Musa broke.3SM windows more from-that surprised.2SM  
*lazannu kasrat(=o) nuha*  
 because broke.3SF(=it) nuha  
 \*'Musa broke more windows than you were surprised because Nuha did.'
- b. *musa kasr fababiik zaktar min illi tafadzazat*  
 Musa broke.3SM windows more from that surprised.2SM  
*lazannu kasrat\*(=o) nuha*  
 because broke.3SF(=it) nuha  
 \*'Musa broke more windows than you were surprised because Nuha did.'

In the remainder of the paper we will focus on the complementizer *ma*, as it exhibits a complex pattern when it occurs in comparatives that involve comparison of quality and quantity.

### 2.1 Quality and quantity adjectives in *ma* comparatives

The examples in (5) show that in comparisons of quantity, non-embedded standard clauses may include overt nominal material with the same descriptive content as the target of comparison, while in embedded clauses, only the non-identical standard can occur.<sup>3</sup> And in both contexts, the whole constituent (*many*

3. The type of comparatives embedded by factive verbs as the ones in (5b) and (6b) can be expressed by standard clauses headed by the complementizer *illi*, as shown in (i). Note, however, that the identity of the resumptive pronoun in the embedded standard clause is only constrained in its grammatical gender (feminine) and therefore can be linked to *sajara* 'car' or any other object grammatically marked as feminine, including plurals, which are grammatically marked as feminine in Palestinian.

- (i) \**samer iftara sajara zakbar min illi bihku (innu)*  
 Samer bought.3SM car bigger from that said.3PL (that)  
*iftarat-ha nuha*  
 bought.3FM-it.F Nuha  
 'Samer bought a bigger car than they said (that) Nuha bought.'

*cookies/bananas*) cannot be spelled out. (As a presentational aid, the grammatical judgements for the use of an identical NP, a different NP, or no NP at all in the standard clause is given as NP1, NP2, and Ø, respectively, preceding each example sentence on the right.)

- (5) a. Comparison of quantity (non-embedded): NP1/NP2/Ø  
*sased zakal baskut zaktar mi-ma zaklat muna*  
 Saed ate.3SM cookies more from-that ate.3SF muna  
 {*baskut / moz / Ø*}  
 {*cookies / bananas / Ø*}  
 'Saed ate more cookies than Muna ate (cookies/bananas).'
- b. Comparison of quantity (embedded): \*NP1/NP2/\*Ø  
*sased zakal baskut zaktar mi-ma bihku (innu) zaklat*  
 Saed ate.3SM cookies more from-that said.3PL (that) ate.3SF  
*muna {\*baskut / moz / \*Ø}*  
 Muna {*cookies / bananas /*}  
 'Saed ate more cookies than they said (that) Muna ate (cookies/bananas).'

In attributive and predicative comparisons of quality (6), no part of the constituent can be spelled out, either in non-embedded or embedded contexts.

- (6) a. Comparison of quality (attributive, non-embedded): \*NP1/\*NP2/Ø  
*samer iftara sayara zakbar mi-ma iftarat nuha*  
 Samer bought.3SM car bigger from-that bought.3FM Nuha  
 (\**sayara kbiira / \*fan kbiir*)  
 (\**car.F big.F / \*van.M big.M*)  
 'Samer bought a bigger car than Nuha bought (\*big) (\*car/van).'
- b. Comparison of quality (attributive, embedded): \*NP1/\*NP2/\*Ø  
 \**samer iftara sayara zakbar mi-ma bihku (innu)*  
 Samer bought.3SM car bigger from-that said.3PL (that)  
*iftarat nuha (sayara kbiira / fan kbiir)*  
 bought.3FM Nuha (car.F big.F / van.M big.M)  
 'Samer bought a bigger car than they said (that) Nuha bought (\*big) (\*car/van).'
- c. Comparison of quality (predicative, non-embedded): \*AP/Ø  
*musa kan zat'wal mi-ma daud kan (\*t'awil)*  
 Musa was.3SM taller from-that Daud was.3SM (\*tall.SM)  
 'Musa was taller than Daud was (\*tall).'

- d. Comparison of quality (predicative, embedded): \*AP/Ø  
*musa kan ʔatʔwal mi-ma bɪhku (innu) daud*  
 Musa was.3SM taller from-that said.3PL (that) Daud  
*kan (\*Tawil)*  
 was.3SM (\*tall.SM)  
 ‘Musa was taller than they said (that) Daud was (\*tall).’

The distribution of *ma* in comparisons of quality and quantity as exemplified by (5–6) raises the following question we will address in this study: Why do quality and quantity comparatives differ in the material they allow to spell out (an identical NP, a different NP or nothing)? Before we propose an account, we present the internal structure of comparatives and the Arabic DP we are assuming.

### 3. Background

#### 3.1 The structure of comparatives in Palestinian Arabic

The comparative adjective in Palestinian Arabic is formed by the pattern *ʔaCCaC*, where the Cs stands for the trilateral root consonants. Unlike Arabic positive adjectives, which agree with the noun they modify in definiteness, gender, and number, the comparative form is invariable.

- (7) Root: *k b r*  
 Comparative: *ʔakbar* ‘bigger’  
 Standard/Adjective: *kbiir* ‘big’

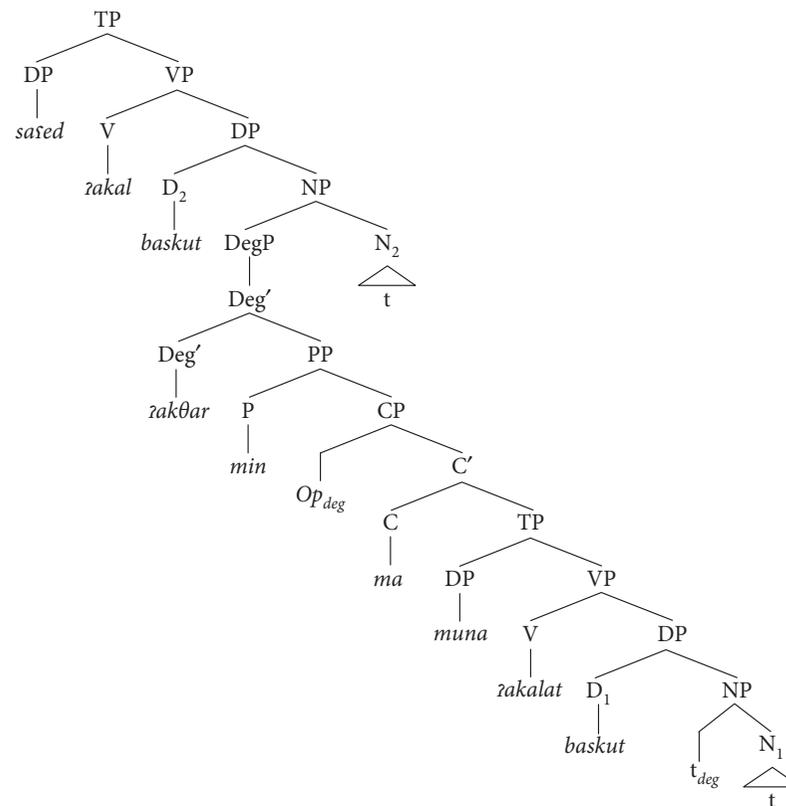
When the comparative pattern is not used, the target of comparison is followed by the comparative marker *ʔaktar* ‘more’, which is itself in the comparative form and derived from *ktiir* ‘a lot, many’

- (8) *mafɣuul ʔaktar / \*ʔaktar mafɣuul*  
 busy more \*more busy.M  
 ‘busier, busiest’

The structure of Palestinian comparatives includes the introduction of the STANDARD of comparison by a standard clause (a CP) headed by complementizer, either *illi* or *ma*. In Arabic, the standard clause is selected for by the preposition *min* ‘from’. (The preposition and complementizer *min ma* are spelled out as *mi-ma*.) Comparative constructions have been shown to have properties characteristic of *wh*-constructions and consequently are argued to involve *wh*-movement of the degree term, categorically a DegP, combined with a mechanism for deleting material (Ross 1967; Bresnan 1973; Chomsky 1977, *inter alia*). The *wh*-movement of the

degree term is triggered by Agree (following Chomsky 1995) between it and the degree operator at Spec,CP, labelled in (9) as *Op<sub>deg</sub>*.

(9)



#### 3.2 The internal structure of the Arabic DP

The array of grammatical constructions in *ma*-comparatives, as presented in Section 2, suggests that quantity and quality comparatives in Palestinian behave differently in relation to movement: Quantity comparatives seem to involve movement with optional deletion, while quality comparatives seem to bar movement, and optional deletion serves to remedy otherwise ungrammatical constructions. In this section, we adopt Fassi Fehri’s (1999) analysis of the internal structure of the Arabic DP, and show that positing that a configurational difference between quality and quantity adjectives with relation to the noun they

modify explains the difference between these types of adjectives on grammatical constructions in comparative constructions.

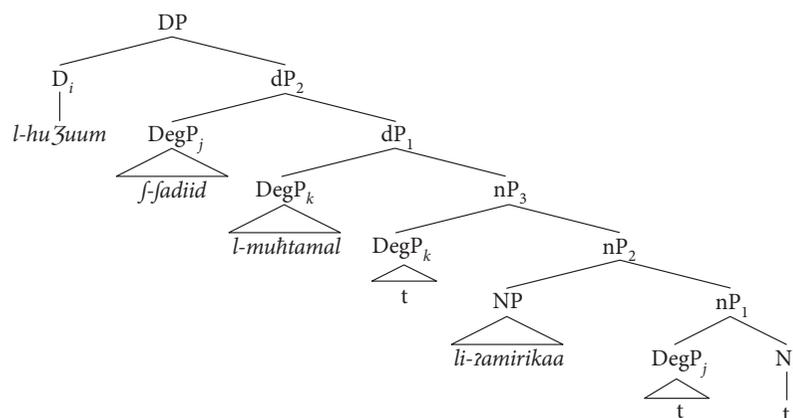
Fassi Fehri (1999) argues for an underlying DP structure parallel with that of the English DP, motivating his analysis with the observation that serial adjectives in the Modern Standard Arabic (MSA) DP, as in (10), display a mirror image of the order of adjectives in English.

- (10) *l-huʒuum-u l-ʒamiriikiyy-u l-waḥfijj-u l-muḥtamal-u*  
 the-attack-NOM the-american-NOM the-savage-NOM the-probable-NOM  
 ‘The probable savage American attack’

Fassi Fehri argues that the adjectives move to functional projections located between the D head and the NP in order to check for definiteness, case (in MSA), Number and Gender.<sup>4</sup> The adjectives move in a nesting manner: The highest AP moves first, and the next one below it moves to a position above it, and so forth, as illustrated in (11b).

- (11) a. *l-huʒuum-u f-fadiid-u l-muḥtamal-u li-ʒamiriikaa*  
 the-attack-NOM the-violent-NOM the-probable-NOM of-America  
 ‘The probable violent attack of the US.’

b.



4. See Mohammad 1988; Fassi Fehri 1999, and Benmamoun 2000 for arguments for N-to-D movement and further details on the internal structure of DPs in Semitic. Also, see Cinque 1996 for a phrasal movement account and Shlonsky 2004 for a movement and incorporation account.

The surface order of elements in the DP is therefore achieved by movement of the N(s) and the AP(s), driven by feature valuing. We will show in the next section how the internal structure of DPs and the structure of comparatives interact in the case of quality and quantity adjectives.

#### 4. Analysis

We begin our explanation of the patterns observed in Section 2 with standard assumptions about movement relations in comparatives. In comparatives, an Agree relation is established between a degree operator  $Op_{deg}$  located at Spec,CP and a degree term in the NP. The degree term carries a [+wh] feature which triggers raising to Spec,CP of the comparative (standard) clause (Ross 1967; Chomsky 1977, 1995; Klein 1980; von Stechow 1984; Heim 1985; Larson 1988; Kennedy 1999; Kennedy & Merchant 2000). As the DegP successive-cyclically moves via Spec,dP to Spec,CP headed by *ma*, it also leaves an instance of [+wh] on *d* via spec-head agreement. Following Kennedy & Merchant (2000), we assume that an occurrence of [+wh] on *d* is uninterpretable at the articulatory-perceptual (PF) interface – there is no phonological matrix that instantiates this particular feature combination – and so must be eliminated over the course of the derivation. If it is not, the resulting structure will be ruled out as a violation of Full Interpretation Chomsky (1995, 2000, 2001).

In what follows, we will argue that this uninterpretable feature complex can be eliminated by deletion operations active in PA comparatives. Specifically, we will argue that comparative derivation in PA involves a local (clause-bounded), optional deletion process that prevents the spell-out of ungrammatical structures, obviating PF violations. The differences between quantity and quality comparatives follow from the interaction of movement and deletion operations: in the former, movement is followed by optional deletion of nominal material, and in the latter, movement is impossible because of the DP internal structure. However, such structures can be rescued by nominal deletion (Kennedy & Merchant 2000). In predicative quality comparatives, in contrast, movement of the whole DegP is possible, and no deletion is necessary, as there is no nominal material that needs to be deleted.

In order to better understand the nature of the *wh*-movement in comparatives in Palestinian Arabic, we will first consider the structure of degree questions, which overtly display *wh*-movement. We will then flesh out the internal structure of the Arabic DP with DegPs to show where the difference between quality and quantity degree terms lies.

## 4.1 Degree questions in Palestinian

The structure of degree questions, such as *how much* and *how many* in Palestinian can shed light on the internal structure of the targeted DP in comparatives, given the shared *wh* features of *wh*-questions and comparative constructions and the overt use of *wh* words in this type of questions.

The [+wh] DP *kam sayara* ‘how many cars’ must be spelled out as one constituent in degree questions, as shown in (12); that is, the whole DP must be pied-piped to Spec,CP.

- (12) a. *kam sayara iftararat dalja*  
 how.many car.SF bought.3SF Dalia  
 ‘How many cars did Dalia buy?’  
 b. \**kam iftararat dalja sayara*  
 how.many bought.3SF Dalia car.SF  
 \*‘How many did Dalia buy cars?’

The quantity DegP in a comparative construction is similar to *kam* ‘how many’ in (12), as it is the structure that carries the *wh*-feature. But while the whole *wh*-phrase *kam sayara* ‘how many cars’ is spelled out and thus clearly exhibits the pied piping, the degree item in the standard clause in comparatives is necessarily null. Therefore, we cannot tell whether the whole DegP overtly moves out of the DP that contains it.

There is no Arabic equivalent of English *how big* or, for that matter, a *how ADJECTIVE* type of construction in Arabic.<sup>5</sup> The only grammatical construction for quality degree questions in Palestinian is translated as ‘what is the height’, as shown in (13).

5. The construction *how ADJECTIVE* does exist in Arabic, but it is not used to form questions but rather exclamatives: expressions of surprise, wonderment, or admiration. The question word used is *zadef* or *qadef* of *ma*. The construction can either include the standard adjective form (i) or the comparative form (ii), and both are akin to the Modern Standard form as in (iii).

- (i) *zadef/qadef kbiir dar-ak*  
 how big.SM house.SM=2SM  
 (ii) *zadef/qadef zakbar dar-ak*  
 how bigger.SM house.SM=2SM  
 (iii) *ma zakbar-an bajt-u-ka*  
 what bigger-ACC house-NOM=2SM  
 (i–iii) = ‘Is your house big?’

See Elliott (1974), Grimshaw (1979), and Zanuttini & Portner (2003) for arguments for treating *wh*-exclamatives as a clause type different from *wh*-interrogatives.

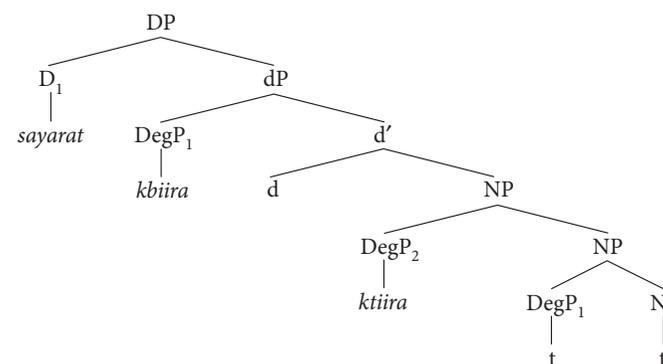
- (13) a. \*{*kam/zadef*} *t'awil musa?*  
 How.much tall.MS musa  
 ‘How tall is musa?’  
 b. {*kam/zadef*} *t'uul musa?*  
 How.much height musa  
 ‘How tall is Musa?’

The short survey of degree questions in Palestinian Arabic reveals that quality and quantity adjectives behave differently, similarly to comparative constructions. While in quantity degree questions the whole DegP phrase must be pied piped, the quantity degree terms cannot be moved and therefore only the nominal form (e.g. *height* instead of *tall*) can be used. In comparative constructions, DegPs cannot overtly move, but may move at LF.

## 4.2 The internal structure of the Palestinian DP with a comparative DegP

Recall that Arabic displays a mirror image of the order of adjectives in serial adjective constructions. Quantity adjectives are last in serial adjective constructions in Arabic, as shown in (14a). We take the position of the quantity adjective *ktiira* in (14a) to be evidence for a configurational difference between the quality (*kbiira* ‘big’) and quantity (*ktiira* ‘many’) adjective: The quantity adjective *ktiira* ‘many’ doesn’t move out of the NP, while the quality adjective *kbiira* ‘big’ does, as shown in (14b).

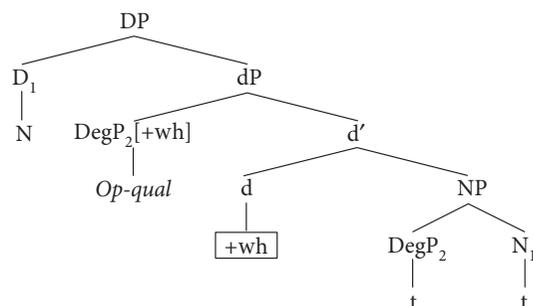
- (14) a. *sayarat kbiira ktiira*  
 cars.F.PL big.SF many.SF  
 ‘Many big cars’



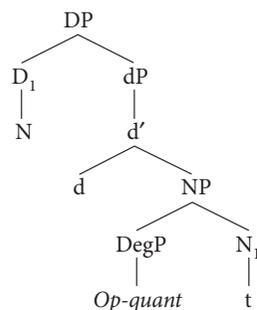
The internal structure of the Arabic DP, as given in (14b), is formed as follows. The quality DegP *kbiira* ‘big’ moves to Spec,dP in order to value agreement features.

Since this DegP has a [+wh], it discharges it to the *d* head as it moves to Spec,dP, and in fact discharges this feature to every head with which it is in Spec-Head relation as it moves successive-cyclically. See (15a) for an illustration. Quantity adjectives, on the other hand, do not move to a *d* head, but rather stay in the NP, and thus the *d* head does not receive the [+wh] feature, as shown in (15b).

- (15) a. The internal structure of the DP in quality comparatives:



- b. The internal structure of the DP in quantity comparatives:



As noted above, the analysis we present here has consequences in light of the principle of FULL INTERPRETATION (Chomsky 1995), which states that features that are only relevant to the syntactic component must be checked and deleted before the derivation is submitted to other levels of representation, namely Phonological Form (PF) or Logical Form (LF), otherwise the derivation will crash.

Going back to the Arabic DP internal structure, the quality DegP moves to Spec,dP, discharging a [+wh] feature. This feature is a consequence of *wh*-movement of the DegP, but does not correspond to a lexical entry corresponding to a [+wh] *d* head when the structure is submitted to PF, leading the derivation to crash. This analysis explains why quality adjectives cannot occur in the standard clause of a comparative sentence. The only way to have such

a structure is to delete the constituent that contains the offending *d*, namely the whole DP, as the sentence in (6a), given again below, shows.

- (6) a. Comparison of quality (attributive, non-embedded): \*NP1/\*NP2/Ø  
*samer iftara sayara zakbar mi-ma iftarat nuha*  
 Samer bought.3SM car bigger from-that bought.3FM Nuha  
 (\**sayara kbiira / fan kbiir*)  
 (\*car.F big.F / van.M big.M)  
 'Samer bought a bigger car than Nuha bought (\*big) (\*car/van).'
- b. Comparison of quality (attributive, embedded): \*NP1/\*NP2/\*Ø  
 \**samer iftara sayara zakbar mi-ma bħku (innu)*  
 Samer bought.3SM car bigger from-that said.3PL (that)  
*iftarat nuha (sayara kbiira / fan kbiir)*  
 bought.3FM Nuha (car.F big.F / van.M big.M)  
 'Samer bought a bigger car than they said (that) Nuha bought (\*big) (\*car/van).'

Recall also that the offending structure cannot be rescued in embedding contexts, as in (6b) above. We take this to indicate that the deletion process that is available in (6a) is clause-bounded in (6b) and thus blocked. We leave the questions regarding the licensing and domain of the deletion process to future research.

Quantity DegPs in comparatives, on the other hand, do not lead to a *d* head with a [+wh] feature and thus no PF violation occurs, because the quality DegP does not leave the NP. Therefore, comparatives with quantity DegPs and a fully spelled-out DP in the standard clause are grammatical, as (5a) shows. As with comparatives with quality DegPs, deletion is clause-bounded, as shown in (5b).

- (5) a. Comparison of quantity (non-embedded): NP1/NP2/Ø  
*sased zakal baskut zaktar mi-ma zaklat muna*  
 Saed ate.3SM cookies more from-that ate.3SF muna  
 {*baskut / moz / Ø*}  
 {cookies / bananas / Ø}  
 'Saed ate more cookies than Muna ate (cookies/bananas).'
- b. Comparison of quantity (embedded): \*NP1/NP2/\*Ø  
*sased zakal baskut zaktar mi-ma bħku (innu) zaklat*  
 Saed ate.3SM cookies more from-that said.3PL (that) ate.3SF  
*muna {\*baskut / moz /\*Ø}*  
 Muna {\*cookies / bananas /}
- 'Saed ate more cookies than they said (that) Muna ate (cookies/bananas).'

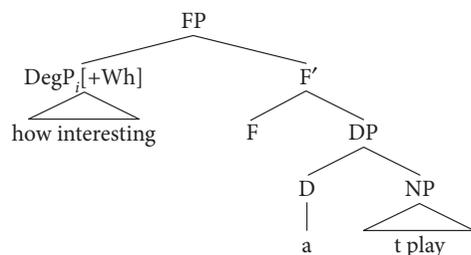
### 4.3 Broader implications of Full Interpretation and salvation by deletion

Our account is akin to Kennedy & Merchant's (2000) analysis for cases of Left Branch Condition (Ross 1967) and the remedying effect of deletion. Kennedy & Merchant show that comparatives with attributive adjectives exhibit Left Branch Condition (LBC) effects, which are solved by deleting the constituent that contains the attributive adjective. The sentence in (16a) is ungrammatical because there is an extraction of a degree element from a left-adjoined position in the DP *a play*, namely *d-interesting*. The sentence becomes grammatical if the whole DP that contains the extraction position is deleted (16b) or any other larger constituent that contains the extraction locus, such as a VP (16c), or a CP (16d). (Angled brackets delineate deleted structures.)

- (16) a. \*Margaret Attwood wrote a more interesting novel than Brett Neveu wrote a play.  
 b. Margaret Attwood wrote a more interesting novel than Brett Neveu wrote  $\langle$  [<sub>DP</sub> a play]  $\rangle$ .  
 c. Margaret Attwood wrote a more interesting novel than Brett Neveu did  $\langle$  [<sub>VP</sub> write a play]  $\rangle$ .  
 d. Margaret Attwood wrote a more interesting novel than I thought  $\langle$  [<sub>CP</sub> that Brett Neveu wrote a play]  $\rangle$ .

The ungrammaticality of (16a) is explained by the movement of the DegP *how interesting* out of the DP via a functional projection FP (see structure in 17). The DegP discharges a [+wh] feature to the head *F*, but since there is no [+wh] lexical item to insert at PF, the structure violates Full Interpretation and causes the derivation to crash. A comparative construction involving attributive constructions is grammatical when a constituent containing the FP is deleted.

(17)



In PA, quality DegPs cannot move out of the DP. Deletion of the DP containing the offending DegP renders the comparative grammatical, as well as deleting larger structures containing the DegP, as (18) shows, where the DP is contained in the deleted CP.

- (18) *samer iftara famsiya zakbar mi-ma hisibt < ... DP ... >*  
 Samer bought.3SM umbrella bigger from-that thought.1S  
 'Samer bought a bigger umbrella than I thought  $\langle$  ... DP ...  $\rangle$ '

Deletion plays an important role in LBC constructions as well as the cases of quality comparatives in Palestinian Arabic we have discussed here. The ungrammaticality of all of these structures can be explained in terms of PF violations, which can be obviated by deleting the offending sub-structures.

## 5. Conclusion

Quantity and quality adjectives have a different distribution in comparative constructions in Palestinian Arabic. The different distribution can be explained in configurational terms: The internal structure of the DP prohibits the movement of quality adjectives but not of quantity adjectives. Movement of the quality adjectives within the DP and out of the DP creates structures whose feature complexes do not correspond to lexical items in PA, i.e. it incurs a PF violation. Deletion that removes the offending structure renders that comparative structure grammatical.

One implication of our analysis is that quality and quantity adjectives in Arabic interact differently with the noun they modify. While quality adjectives move out of the NP to functional projections in the DP, quality adjectives stay in the NP. This observation is the first step in a much-needed investigation of the morpho-syntactic and semantic differences between the two types of adjectives.

In addition, this study contributes to the study of the internal structure of the Arabic DP. The Arabic – and, in general, Semitic – DP involve complex structures such as the Construct State and intricate agreement relations between the head noun and its modifiers. In this study, we draw attention to the complexity of the configurational relations between the noun and adjective(s).

Finally, the interplay between syntactic operations, namely movement, and their effect on the PF output, following the principle of Full Interpretation or obviation thereof by deletion, lend further support to the claim that some violations that have been considered purely syntactic (e.g. Left Branch Conditions) are in fact PF violations that can be remedied by deletion.

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# The verb *kan* ‘be’ in Moroccan Arabic\*

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The unit *kan* ‘be’ in Moroccan Arabic (MA) is traditionally identified as a copula in the context of a non verbal unit and as an auxiliary in the context of a verbal unit. We argue here that the notion of copula, borrowed from the Indo-European languages, is not relevant for *kan* in MA. *Kan* is not a copula but a *connective verb*. Although it is semantically weak, *kan* is syntactically a full verb, particularly a bivalent verb requiring two essential arguments: a subject and an attribute. Therefore, in the connective structures, *kan* is the syntactic nucleus (syntactic predicate). Moreover we show that *kan*, in the context of a verbal unit, even though it exhibits some auxiliary’s features – is not an auxiliary inasmuch as it doesn’t form a “structure of auxiliaryity” (Simeone-Senelle & Vanhove 1997:86) – i.e. a morphological, semantic and syntactic unit – with a second verb. *Kan* is a bivalent existence-verb governing two arguments; the second argument can be a verbal phrase.

## 1. Introduction

The unit *kan* ‘be’ in MA is usually translated into ‘be’ in English or into ‘être’ in French. It is analyzed as a copula in the context of a non verbal unit (1) and as an auxiliary in the context of a verbal unit (2).

(1) *ʕli kan-Ø muḥami*  
Ali be-3M<sup>1</sup>.PERF attorney  
‘Ali was attorney.’

(2) *ʕli kan-Ø ja-kul*  
Ali be-3M.PERF 3M.IMP-eat  
‘Ali was eating.’

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1. Abbreviations: asp: aspect; f: feminine; fut: future; imp: imperfective; imper: imperative; rlit: literally; m: masculine; neg: negation; nom: nominative; perf: perfective; pl: plural, pr: present; 1, 2, 3: first, second, third person; TAM: Tense-Aspect-Mood.

We argue here that the notion of copula, borrowed from the Indo-European languages, is not relevant for *kan* in MA. We also put forward that *kan* is not an auxiliary even though it exhibits some auxiliary features. First, we discuss the copula's notion. Then, following Babiniotis & Clairis (1999) and Clairis et al. (2005), we analyze the MA *kan*, in (1), not as a copular verb – i.e. a unit semantically empty linking two non verbal units in a predicative relationship – but as a syntactic nucleus, a verbal core in a connective structure. Second, we examine some contexts in which the MA *kan* is commonly identified as an auxiliary. We compare *kan* to other auxiliaries, particularly the grammatical verb-determiner *ya(di)* ('future tense'), and the unit *za* which behaves in MA as a full verb meaning 'to come' or as an auxiliary verb expressing the imminence, the intention: 'to be just going to', 'to intend to' (Caubet 1995:41).

## 2. The copula's notion

In the Indo-European languages, the copula's notion refers to any form of the verb 'be' used as a "link" or "coupling" between two non verbal units. It is inherited from logic and specifies the third term of Aristotle's syllogisms such as "A is B" (*homo is mortalis*).

In the Arabic grammatical tradition, this term has been translated into the word *rabit'a*: " (...) dans l'ensemble des langues (...) il existe un mot (...) qui relie le prédicat au sujet lorsque celui-ci est un nom, ou lorsqu'on veut (...) que le prédicat soit lié au sujet d'un lien absolu, sans mention de temps (...). Ce mot est en persan *hast*, en grec *estin*, en sogdien *esti* [(...) in the whole languages, it exists a word (...) that links the predicate to the subject when this one is a noun, or when we want (...) the predicate to be coupled to the subject with an absolute link, without any indication of time (...). This word is in Persian *hast*, in Greek *estin*, in Sogdian *esti*]" (Al-Faraabi 1969, in Elamrani-Jamal 1983:133). But this word doesn't exist in Arabic from the beginning and becomes a necessity "quand la philosophie parvint aux Arabes, et que les philosophes d'expression arabe eurent besoin d'exposer en cette langue leur discours sur les idées contenues dans la philosophie et la logique [when the philosophy came to the Arabs, and when the Arabic language philosophers needed to expose in this language their discourse on the ideas contained in philosophy and logic]" (Ibid.).

Al-Faraabi presents the two artificial procedures used to substitute an Arabic word to the Greek and Persian's copula:

1. Inserting the pronoun *huwa* 'him' between the predicate and the subject (*Zajd huwa sa:dilan* 'Zayd, him, fair', 'Zayd is fair').

2. Adding the verbal noun *mawzu:d* "existing" as a third term (*Zajdun mawzu:dun sa:dilan* 'Zayd existing fair', 'Zayd is fair').

Note that *huwa* and *mawzu:d* are used only as "signes sémantiques d'un terme de jonction pour la représentation [semantic signs of a junction's term for the representation]" (Elamrani-Jamal 1983:135) and not as signs of a syntactic relationship.

It would seem that the *rabit'a*'s concept has not been applied immediately to *kāna*.<sup>2</sup> The problem, in fact, is not the presence or non presence of a verb to signify the 'existence' in Arabic, but rather the impossibility to use *kāna* as a pure logical term, linking two linguistic units in a timeless present.<sup>3</sup>

In the following paragraph, we will deal with the copula's notion related to *kan* in MA.

### 2.1 Zero/null copula vs. copular verb

The example (4) below is generally characterized as a 'be'-nominal sentence (a *kan*-nominal sentence) in contrast with the example (3) characterized as a verbless sentence:<sup>4</sup>

(3) *ʕli mrʕidʕ*  
Ali sick  
'Ali is sick.'

(4) *ʕli kan-∅ mrʕidʕ*  
Ali be-3M.PERF sick  
'Ali was sick.'

In (4), *kan* is analyzed as a copular verb i.e. a unit with a verbal form but without a verbal role, simply a link between two nominal terms. In (3), the absence of an overt mark would represent a zero or null copula. This contrasts:

- a. an overt mark (*kan*) to a non overt mark (zero/null copula);
- b. a sentence with a deficient verb (4) to a sentence "verbally" deficient (3) (verbless sentence).

2. See Madkour (1969:162): "Ce verbe ['être'] lui-même n'a servi de copule dans la phrase nominale qu'assez tard [This verb ['be'] itself has served as a copula in the nominal sentence quite late]".

3. In fact, the imperfective *yakūnu* can't be used to express a deictic present; it is used to convey the future or the epistemic value of probability (cf. §1.1).

4. Benmamoun (2000:39–50) discusses various theoretical positions relating to the copula.

We will rely here on Benveniste (1966) who proposes the following analysis for the Indo-European languages:

Une phrase à verbe *être* est une phrase pareille à toutes les phrases verbales. Elle ne saurait (...) être prise pour une variété de phrase nominale. Un énoncé est nominal ou verbal. (...) la phrase nominale ne saurait être considérée comme privée de verbe. Elle est aussi complète que n'importe quel énoncé verbal. On ne saurait non plus la tenir pour une phrase à copule zéro, car il n'y a pas lieu en indo-européen d'établir entre phrase nominale et phrase verbale à 'être' une relation de forme zéro à forme pleine [A *be*-sentence is similar to the whole verbal sentences. It couldn't (...) be considered as a variety of nominal sentence. An utterance is nominal or verbal. (...) the nominal sentence couldn't be considered as verbless. It is as complete as any verbal utterance. It couldn't be either regarded as a zero-copula's sentence since there is no reason in Indo-European to set up between a nominal sentence and a 'be'-sentence a relationship linking a form zero and a full form]" (Benveniste 1966: 157)

Structurally, a nominal sentence is an assertive utterance as finished as any other. Bravmann rightly underlines that the nominal sentence in Arabic cannot be considered as a primitive stage of the verbal sentence:

"(...) any genetic explanation of the nominal sentence with a copula has to start from the nominal sentence without a copula (i.e. in our instance, from the pure nominal sentence *Zaydun hasanun* 'Zayd is handsome') as the primary base and, consequently, to explain it (i.e. *kana Zaydun hasanun*) as an enlargement of the latter" (Bravmann 1953: 73)

Moreover, the copula is generally regarded as semantically weak or even totally empty of any semantic content. It is well-known that, throughout the grammaticalisation process, a unit can be emptied gradually of its lexical meaning to catch a grammatical one. Units with a high frequency become semantically lighter and their value varies according to units around them. However, should we consider *kan* as a unit lexically empty with the only role to serve as a formal "crutch" to the TAM (tense-aspect-mood) markers? For Fassi-Fehri (1993: 152), "(...) the appearance (or non-appearance) of the copular verb is motivated in terms of the tense opposition. The marked member (the past) forces the copula to be visible, whereas the unmarked member (the present) does not". Fassi-Fehri also underlines (p. 88) for Classical Arabic:

(...) nominal sentences do contain T. (...) There is empirical evidence supporting this view. Temporal adverbs locate the event in time, and depending on their temporal specification, they may or may not be compatible with the tense morphology encoded on the verb. (...) Similar contrasts obtain in nominal

sentences, pointing clearly to the fact that their inflectional structure contains a non-past T.

The examples below are from Fassi-Fehri (Ibid.):

- (5) *r-raʒul-u mariid<sup>f</sup>-un l-zaana*  
the-man-NOM sick-NOM now  
'The man is sick now.'
- (6) *\*r-raʒul-u mariid<sup>f</sup>-un ʔamsi*  
the-man-NOM sick-NOM yesterday

Nevertheless, a nominal sentence, once put in speech, is necessarily situated in time according to the context or the situation of which it forms part. The example (7) below, with the deictic adverb *lbaraḥ* 'yesterday' and with an appropriate intonation, is utterly possible in MA:

- (7) *ḥməd mr<sup>f</sup>id<sup>f</sup> lbaraḥ*  
Ahmed sick yesterday  
'Ahmed was sick yesterday.'

Most often, a *kan*-sentence is first understood as the past counterpart of a nominal sentence. The question that must be asked is actually: what value would emerge from the perfective/imperfective opposition, this opposition being at the root of the MA verb-system?

- (8) *ʕli kan-Ø ʕijan*  
Ali be-3M.PERF tired  
'Ali was tired.'
- (9) *ʕli j-kun ʕijan*  
Ali 3M.IMP-be tired  
1. 'Ali must be tired.'  
2. 'Ali will be tired.'

Benmamoun (2000: 47) rightly points out that a null copula analysis is not legitimate "(...) since there is an overt form of the copula that can occur in the present tense". Benmamoun also underlines (p. 48) that the generic sentences can contain the copula but "in deictic present tense the imperfective form of the copula is not allowed (...)" and he proposes the following examples (p. 47):

- (10) *ta-j-kun l-ʒəww ʕxun f-s<sup>f</sup>-s<sup>f</sup>if*  
ASP-3M-be the-weather hot in-the-summer  
'The weather is usually hot in summer'
- (11) *ʕumar (ta-j-kun) t<sup>f</sup>wil*  
Omar (\*ASP-3M-be) tall

Though, in these examples, the imperfective coexists with the grammatical verb-determiner *ka/ta* which serves here to mark the generic present. The single imperfective would confer to the sentence a temporal value, the future (12-1), or a modal value, the probability (12-2):

- (12) *j-kun l-ʒəww sxun f-sʰ-sʰif*  
 IMP.3M-be the-weather hot in-the-summer  
 1. 'The weather will be hot in (this) summer.'  
 2. 'The weather must be hot in summer.'

On the other hand, the nominal sentence (13) below, without *kan*, may also be interpreted as a generic present because of the third term *f-sʰ-sʰif*:

- (13) *l-ʒəww sxun f-sʰ-sʰif*  
 the-weather hot in-the-summer  
 'The weather is (usually) hot in summer.'

The sentence (11) above is not possible; the unit *twil* 'tall' (meaning a permanent physical property) is semantically incompatible with the generic value carried by the unit *ka/ta*. This sentence is nevertheless possible with the only imperfective:

- (14) *ʕumar j-kun tʰwil (bʰal bʰa-h)*  
 Omar IMP.3M-be tall like father-his  
 1. 'Omar must be tall (now) (as his father).'  
 2. 'Omar will be tall (in the future) (as his father).'

According to the context or the situation, this example is located in the present with a modal value (14-1) or in the future with a temporal value (14-2).

To mean the concomitance, the simultaneity between two references – the event and another reference –, we can use in MA the unit *ra-*.<sup>5</sup> In (15), *ra-* marks the simultaneity between the event and the speech moment, and hence a deictic present:

- (15) *ħməd rʰa-h mrʰidʰ*  
 Ahmed rʰa-3M Sick  
 'Ahmed is (at present) sick.'

5. The unit *rʰa-* would be a trace of the Classical Arabic verb meaning 'to see', *raʿa* (cf. Caubert 1993:25; Youssi 1992:186). In MA, *rʰa-* has completely lost this meaning and it is used such as a deictic particle.

Two main contrasts are thus possible:

1. A modal opposition: (8) *sli kan siyan* vs (9) *sli jkun sijan*. The relation is between the enunciator and its utterance: the enunciator evaluates and presents its utterance as certain, as having taken place (8) or as possible (9).
2. A temporal opposition: (4) *sli kan mrʰidʰ* vs (15) *sli rʰah mrʰidʰ*. The past is opposed to the non-past.

To conclude on this point:

First, the MA nominal sentence (i.e. sentence with non verbal units only) is not marked by Tense. The noun, the pronoun, the adjective and the adverb – the syntactic predicates in a nominal sentence – are not syntactically compatible with the TAM markers. We could consider the nominal sentence as the 'bare form' of the sentence since its temporal, aspectual and/or modal interpretation varies according to the context. We could bring the value closer to the nominal sentence in MA with that of the French or English present tense, the 'bare form' of the verb. In MA, there is no bare verb, seeing as it requires necessarily the perfective or the imperfective to operate in discourse.

On the other hand, a verbal sentence structured around the verbal core *kan* is as finished as any other verbal sentence. The temporal, modal or aspectual interpretation does not depend on the presence or non presence of the verb *kan* but on the syntactic construction and on the TAM markers, as for any verb.

## 2.2 *Kan* is a connective verb

Following Babiniotis & Clairis (1999) and Clairis et al. (2005), we set up a distinction between two types of syntactic structures: the connective syntax and the nuclear syntax. These terms specify here two syntactic structures, two syntactic constructions and not two different kind of syntax. The relations established between the units of a linguistic message are different if we are in connective syntax or in nuclear syntax. The connective syntax is opposed to the nuclear syntax insofar as the core (the syntactic nucleus of the sentence) requires a particular construction to communicate a specific signification. In nuclear syntax, the core is a verb controlling one or more arguments, semantically involved in the realization of the process (verbal valence). The connective syntax is not necessarily founded on a verbal core; if so, the verbal nucleus is used as a bridge to connect semantically two arguments. The reference of one argument is modified by the semantic contribution of the other one (Clairis et al. 2005:17).

We consider below some examples of **attributive** connective syntax. In these connective structures, the central nucleus identifies or attributes a quality.

a. *Direct connection*

In MA, two non verbal units can be connected directly, without any connector. The simple juxtaposition of two terms is enough to build a sentence syntactically complete:

- (16) *ħmād musəllim*  
Ahmed teacher  
'Ahmed is teacher.'
- (17) *ħmād l- musəllim (3a-Ø l-d<sup>f</sup>-d<sup>f</sup>ar<sup>f</sup> lbarah)*  
Ahmed the-teacher come-3M.PERF at-the-home yesterday  
'Ahmed the teacher (came at home yesterday).'

In (16), the structure *ħmād musəllim* is a nominal sentence. In this kind of structure, the two terms are directly connected. The first term (*ħmād*) actualize the second one (*musəllim*) in a predicative relationship. Therefore, in this context, *musəllim* is the syntactic nucleus, the syntactic predicate. In principle, in this kind of structure, the first term is [+definite] while the second is not. In (17), the structure *ħmād l- musəllim* is a nominal phrase; the two terms of the relation are [+definite]. However, a distinct intonation (highlighted in bold in (16')) on the first term or a discernible break allows a [+definite] nucleus in a nominal sentence:

- (16') *ħmād l- musəllim (mafi sli)*  
Ahmed the-teacher not Ali  
'**Ahmed** is the teacher (not Ali).'

b. *Connection via a connective verb*

The unit *kan* belongs to the paradigm of state verbs called in Classical Arabic *axawaatu kaana* 'kaana's sisters'. *Kan*'s value can be identified when it is opposed, in its own paradigm, to its "sisters", e.g.:

- (18) *sli kan- Ø m<sup>r</sup>id<sup>f</sup>*  
Ali be-3M.PERF sick  
'Ali was sick.'
- (19) *sli s<sup>i</sup>bah- Ø m<sup>r</sup>id<sup>f</sup>*  
Ali be at the morning-3M.PERF sick  
'Ali was sick at the morning.'
- (20) *sli da<sup>f</sup>- Ø m<sup>r</sup>id<sup>f</sup>*  
Ali be all the day-3M.PERF sick  
'Ali was sick all the day.'

- (21) *sli bat- Ø m<sup>r</sup>id<sup>f</sup>*  
Ali be all the night-3m.perf sick  
'Ali was sick all the night.'

*Kan* is the more frequent and therefore semantically lighter than other verbs. It takes place on a duration continuum: from a verb without inherent limitation toward verbs indicating duration inside the 24 hours of a day.

In these contexts, *kan* and its "sisters" are connective verbs i.e. bivalents verbs requiring and governing necessarily two complements, a subject and an attribute. Connective verbs are specialized in the attributive connection. They behave as others MA connective verbs, for example *ban* "to seem" or *sdaq* "to prove":

- (22) *d<sup>f</sup>-d<sup>f</sup>ar t-ban kbira*  
the-house 3F.IMP-seem big  
'The house seems big.'
- (23) *mərxəm s<sup>i</sup>daq<sup>a</sup>-t d<sup>r</sup>r<sup>i</sup>ijfa*  
Meryem prove-3F.PERF nice  
'Meryem proved to be nice.'

Note that, in an attributive connective structures, an adjective can modify a verb; it is not possible in a nuclear structure. The number and gender agreement is between the subject and the attribute and not only between the subject and the verb as in nuclear syntax.

To conclude; in attributive connective structures, *kan* is the syntactic verbal core, the syntactic predicate although it isn't the more semantically informative. As a connective verb, *kan* governs syntactically two arguments, two essential complements: a subject and an attribute. This latter is traditionally considered as the predicate; in our analysis, it is just one of the verb *kan*'s arguments.

In the second part of this paper, we consider some contexts in which *kan* is usually considered as an auxiliary.

3. *The auxiliary's notion*

In (24) below, *kan* is most often analyzed as a temporal auxiliary:

- (24) *sli kan- Ø j-xdem*  
Ali be-3M.PERF 3M.IMP-work  
'Ali was working.'

To a certain extent, *kan* is an auxiliary inasmuch as it is a "semantic support" (Larcher 2003:144). Because of its etymology, its weak semantic weight and its high frequency, it is indeed quite easy for *kan* to join with another verb.

There are various definitions of the term “auxiliary”. Here, we will rely on Heine (1993) who gives, among others, the following recognition's criteria:

- As a result of decategorialization (...), it [auxiliary] occupies a fixed place in the clause and exhibits a reduced verbal behavior, for example, it may only associate with a restricted spectrum of verbal inflection, and it may lack the ability to occur in nonfinite forms, to be passivized, or to form imperatives (...).
- As a result of erosion (...) it may have a phonologically reduced form and it may be unable to carry distinctive stress or tone (...).
- It has at least two different uses, one of which is a lexical and the other a grammatical one, or one shows a full and the other a reduced verbal morphosyntax, or one has a full and the other a phonologically reduced form etc., and that
- It may be associated with two different meanings corresponding to one form, or two different forms expressing one and the same meaning (Heine 1993: 86–87).

Are these criteria relevant for *kan* in (24)?

First, we note that it is quite difficult to associate *kan* with two different meanings, a lexical one and a grammatical one. An utterance as the French *Dieu est*, ‘God exists’ is possible in MA only with the participle *kajin* (25) or *muzud*, derivate from the stem *wʒD*, (26):

(25) *Allah kajin*  
Allah being  
‘Allah exists.’

(26) *Allah muzud*  
Allah existing  
‘Allah exists.’

We must also note that *kan* is not a deficient verb: it is as fully inflected as any other full verb since it is compatible with the whole verb-determiners (see Table 1 below), with the imperative (27) and the participle (25):

(27) *Ø-kun-i kammal-ti fyul-d<sup>s</sup>-d<sup>r</sup>ar<sup>s</sup> qbal tilata!*  
2.IMPER-be-F achieve-2F.PERF work-the-house before three  
‘Have finished the housework before three o'clock!’

In MA the verb is necessarily determined by the perfective or the imperfective. The perfective/imperfective opposition is formally marked by the agreement marker.

Prefixed to the verb, the agreement marks the imperfective (28), suffixed to the verb, it marks the perfective (29):

(28) *mərjəm t-zi ljum*  
Meryem 3F.IMP-come today  
‘Meryem comes (will come) today.’

(29) *mərjəm ʒa-t ljum*  
Meryem come-3F.PERF today  
‘Meryem came today.’

The perfective and the imperfective are mutually exclusive. The two other grammatical determiners of the verb-system, *ka/ta* and *va(di)*, also mutually exclusive, can coexist only with the imperfective. Hence, we can identify two distinct classes of grammatical verb-determiners: a first one including the perfective and the imperfective and a second one with *ka/ta* and *va(di)*:

Table 1. Basic MA verb-system

| 1    | 2                   |                                         |                                                                                                      |
|------|---------------------|-----------------------------------------|------------------------------------------------------------------------------------------------------|
| IMP  |                     | <i>j-xdəm</i><br>3M.IMP-work            | ‘He works’<br>‘He will work’                                                                         |
| PERF |                     | <i>xdəm-Ø</i><br>work-3M.PERF           | ‘He worked’                                                                                          |
| IMP  | PR ( <i>ka/ta</i> ) | <i>ka-j-xdəm</i><br>PR-3M.IMP-work      | ‘He works’<br>(generic, iterative, habitual...)<br>‘He is working’<br>(concomitant with a reference) |
| IMP  | FUT ( <i>va</i> )   | <i>va(di)-j-xdəm</i><br>FUT-3M.IMP-work | ‘He is going to work’                                                                                |

The value of the perfective/imperfective opposition is contextually dependent; *va(di)* is a future tense marker; *ka/ta* conveys different meanings, all linked in some ways to the present (generic, habitual, iterative, concomitant with a reference); that's why we specify *ka/ta* as a present tense marker.

The origin of the marker *ka/ta* is today opaque and the future tense marker *vadi*, stemming from the active participle of the verb meaning ‘go’, can be reduced to *va* according to the speakers. *Ka/ta* and *va* are invariable, morphologically crystallized while *kan* is variable.

Youssi (1992) and Morhenan (1994) classify the MA *kan* with *ka/ta* and *va* in the class of “modalités verbales” i.e. grammatical determiners non determinable and syntactically compatible with verbs only. We don't agree with them.

### 3.1 The position of *kan* in the sentence

The unit *ka/ta* and the unit *va* have a fixed place in the sentence; they are always prefixed to the verb they modify. The examples (29) and (30) are not possible:

(29) \**ħməd ka f-d<sup>s</sup>-d<sup>s</sup>ar<sup>s</sup> ja-kul l-xubz*  
Ahmed PR in-the-house 3M.IMP-eat the-bread

(30) \**ħməd va f-d<sup>s</sup>-d<sup>s</sup>ar<sup>s</sup> ya-kul l-xubz*  
Ahmed FUT in-the-house 3M.IMP-eat the-bread

(31) *ħməd yadi l-d<sup>s</sup>-d<sup>s</sup>ar<sup>s</sup> ja-kul l-xubz*  
Ahmed going at-the-house 3M.IMP-eat the-bread  
'Ahmed is going at home to eat some bread.'

The example (31) is of course grammatical with *yadi* 'going', the active participle of 'go', requiring the preposition *l-* 'at'. *yadi*, verb of motion, is the main verb in (31), that's why it governs the presence and the form of a locative argument. The meaning of 'existence' of the verb *kan* requires the preposition *f-* 'in', (32):

(32) *ħməd kan-Ø f-d<sup>s</sup>-d<sup>s</sup>ar<sup>s</sup> ja-kul l-xubz*  
Ahmed be-3M.PERF in-the-house 3M.IMP-eat the-bread  
'Ahmed was at home eating some bread.'

The position of *kan* in the sentence is not fixed. It can be separated from V2 and placed between the subject and an argument (32) or at the first (33):

(33) *kan-Ø ħməd f-d<sup>s</sup>-d<sup>s</sup>ar<sup>s</sup> ja-kul l-xubz*  
be-3M.PERF Ahmed in-the-house 3M.IMP-eat the-bread  
'Ahmed was at home eating some bread.'

But it can't be separated from its lexical subject if this latter is expressed in the sentence:

(34) \**kan-Ø f-d<sup>s</sup>-d<sup>s</sup>ar<sup>s</sup> ħməd ja-kul l-xubz*  
be-3M.PERF in-the-house Ahmed 3M.IMP-eat the-bread

In MA, the unit *za* can be used as a full verb meaning a physical motion, 'to come' and in a "structure of auxiliarity" (Simeone-Senelle & Vanhove 1997: 86) to express an aspectual value: the imminence, the intention ('to be just going to', 'to intend to'). In the examples (35) and (36), *za* marks the simultaneity between two events: 'to be just going to eat' and 'the phone's ring'.

(35) *ħməd za-Ø ja-kul*  
Ahmed just going to-3M.PERF 3M.IMP-eat  
(*u t-tilifun serser-Ø*)  
(and-the-phone ring-3M.PERF)  
'Ahmed was just going to eat (and the phone rang).'

(36) *ħməd j-zi ja-kul*  
Ahmed 3M.IMP-just going to 3M.IMP-eat  
(*u t-tilifun y-serser*)  
(and-the-phone 3M.IMP-ring)  
'Ahmed is just going to eat (and the phone rings).'

As auxiliary, *za* cannot be separated from V2 by an external argument. If so, *za* recovers its meaning of physical motion and the structure is no more an auxiliary one, (37):

(37) *ħməd za-Ø l-d<sup>s</sup>-d<sup>s</sup>ar<sup>s</sup> ja-kul*  
Ahmed come-3M.PERF at-the-house 3M.IMP-eat  
'Ahmed came at home to eat.'

In (35) and (36), *za* forms with V2 a "structure of auxiliarity", whereas the example (37) is biclausal.

### 3.2 The subject coreferentiality

One of the main characteristics of the auxiliarity's structures is the subject coreferentiality. In most cases, *kan*'s subject and V2's subject are coreferential. Though it is quite easy to find in MA utterances in which *kan* and V2 subjects are not coreferent:

(38) *bəkri kan-t l-sr<sup>s</sup>usa j-dij-u-ha*  
in the past be-3F.PERF the-bride 3.IMP-take to-PL-3F  
*l-səzb-at l-l-ħəmmam*  
the-single girl-PL.F at-the-hammam  
Lit.: In the past days she was (in the state) the bride they take her the single girls to the hammam.  
'In the past, the single girls took the bride to the hammam'

In (38), *l-sr<sup>s</sup>usa* 'the bride' is highlighted with a left dislocation and a pronominal relay, *ha* 'her', object of V2. This type of structure – specific to the narration<sup>6</sup> – is

6. See Brustad Kristen (2000:337–339) for a detailed analysis of these structures.

not rare at all in MA. We can also find it in Classical Arabic. Here is an example from Silvestre de Sacy (1831, I, 213 §430) mentioned by Larcher (2003):

*wa-kuntu qad qāla li min qablu fi*  
 et-être (1 p m s ac) dire (3 p m s ac pas) à- moi de avant sur  
*ḍālika ‘inna-hu...*  
 cela [sic]  
 “et l'on m'avait déjà dit auparavant à ce sujet : ‘il...’”

Cette particularité ne justifie pas seulement qu'on se refuse à traiter *kāna* et le verbe qu'il a dans son champ comme une forme composée, mais encore justifie l'analyse traditionnelle en grammaire arabe de *kāna*, non comme auxiliaire, mais comme un verbe opérateur appliqué à une phrase à tête nominale (...).

(Larcher 2003:143)

So, we analyze the MA *kan* as a bivalent verb governing a subject and a second argument. The second argument can be a prepositional phrase (39) or a verbal phrase (40):

(39) *ljum mərjəm kan-t f-l-zamiša*  
 today Meryem be-3F.PERF in-the-university  
 ‘Today, Meryem was at the university.’

(40) *ljum mərjəm kan-t t-qrā*  
 today Meryem be-3F.PERF 3F.IMP-study  
 Lit.: Today, Meryem was in the state she studies/is studying.  
 ‘Today, Meryem was studying.’

### 3.3 Coordination and subordination

It is well-known; the components of an auxiliary's structure can be neither coordinated nor subordinated. Consider again the verb *za*. In the example (41) below, *za* is ambiguous; it can be understood as meaning ‘to come’ – the full verb – or as “to be just going to”, the auxiliary verb. Though, if we link the two verbs by the subordinating *baf* ‘for’, the ambiguity is raised and *za*, in (42), is fully lexical:

(41) *ʕli za-Ø ja-kul...*  
 Ali come-3M.PERF 3M.IMP-eat  
 ‘Ali came to eat./ ‘Ali was just going to eat...’

(42) *ʕli za-Ø baf ja-kul*  
 Ali come-3M.PERF for 3M.IMP-eat  
 ‘Ali came to eat.’

*za* cannot operate as auxiliary in the context of a verb at the perfective. In (43), *za* means necessarily the physical motion; the two verbs are actually coordinated by a simple juxtaposition. However, we can specify the relationship between the two verbs with the coordinating *u* ‘and’, (44):

(43) *ʕli za-Ø kla-Ø*  
 Ali come-3M.PERF eat-3M.PERF  
 ‘Ali came, he ate.’

(44) *ʕli za-Ø u kla-Ø*  
 Ali come-3M.PERF and eat-3M.PERF  
 ‘Ali came and he ate.’

The motion verb *za* is monovalent, it involves only an agent. *Kan* is not monovalent; if we fill its valence by an agent and two juxtaposed arguments, we can formally specify the relation which links the two arguments: as subordination with a V2 at the imperfective (45); as coordination with a V2 at the perfective (46):

(45) *ħməd kan-Ø f-d<sup>f</sup>-d<sup>f</sup>ar<sup>f</sup> (baʕ) j-xdem*  
 Ahmed be-3M.PERF in-the-house for 3M.IMP-work  
*l-baħt djal-u*  
 the-dissertation of-him  
 ‘Ahmed was at home; he works (to work) on his dissertation.’

(46) *ħməd kan-Ø f-d<sup>f</sup>-d<sup>f</sup>ar<sup>f</sup> (u) xdem-Ø*  
 Ahmed be-3M.PERF in-the-house (and) work-3M.PERF  
*l-baħt djal-u*  
 the-dissertation of-him  
 ‘Ahmed was at home (and) he worked on his dissertation.’

### 3.4 *kan* embeds finite verbs

Another well-known characteristic of auxiliaries is that they modify non-finite verbs. But, in Arabic, the verb is necessarily inflected: there is no bare verb, no infinitive, and the participle varies in gender and number.

The present tense marker *ka/ta*, the future tense marker *ya* and the lexical auxiliary *za* are compatible only with the imperfective, the ‘default’ (Ouali & Fortin 2007:177) determiner of the verb-system. As for *kan*, it is on the one hand compatible with the whole verb-determiners (perfective, imperfective, the tense

markers *ka/ta* and *va*) and in the other hand, it can embed any verbal form. In Table 2 below, we give the different possibilities for the verb *xdem* 'work':

Table 2. Extended MA verb-system

| 1    | 2                    | 3    |                                                                                                                               | Main interpretation                                                                                                                        |
|------|----------------------|------|-------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| IMP  |                      |      | <i>j-xdām</i><br>3M.IMP-work<br>'He works'/ 'He will work'                                                                    | An "imperfect"<br>(i.e. unaccomplished)                                                                                                    |
| PERF |                      |      | <i>xdām-Ø</i><br>work-3M.PERF<br>'He worked'                                                                                  | A "perfect"<br>(i.e. accomplished)                                                                                                         |
| IMP  | PR<br>( <i>ka</i> )  |      | <i>ka-j-xdām</i><br>pr-3M.IMP-work<br>'He works'/ 'He is working'                                                             | A present generic/ habitual/<br>iterative/ concomitant                                                                                     |
| IMP  | FUT<br>( <i>ya</i> ) |      | <i>yadi-j-xdām</i><br>FUT-3M.IMP-work<br>'He is going to work'                                                                | A future                                                                                                                                   |
| IMP  |                      | KAN  | <i>kan-Ø j-xdām</i><br>be-3M.PERF 3M.IMP-work<br>'He was working'                                                             | A past "imperfect"<br>(i.e. unaccomplished)                                                                                                |
| PERF |                      | KAN  | <i>kan-Ø xdem-Ø</i><br>be-3M.PERF work-3.PERF<br>'He had worked'                                                              | A past "perfect"<br>(i.e. accomplished)                                                                                                    |
| IMP  | PR<br>( <i>ka</i> )  | KAN  | <i>kan-Ø ka-j-xdām</i><br>be-3M.PERF pr-3M.IMP-work<br>'he was working'                                                       | A past generic/ habitual/<br>iterative/ concomitant.                                                                                       |
| IMP  | FUT<br>( <i>ya</i> ) | KAN  | <i>kan-Ø ya-j-xdām</i><br>be-3M.PERF FUT-3M.IMP-work<br>'he was going to work'                                                | A future in the past                                                                                                                       |
| IMP  |                      | YKUN | <i>j-kun j-xdām</i><br>3M.IMP-be 3.IMP-work<br>'He must be working'<br>'He will be working'                                   | A probability in the present.<br>or<br>A future "imperfect"<br>(i.e. unaccomplished)                                                       |
| PERF |                      | YKUN | <i>j-kun xdam-Ø</i><br>3M.IMP-be work-3M.PERF<br>'He must have worked'<br>'He will have worked'                               | A probability in the past<br>or<br>A future "perfect"<br>(i.e. accomplished)                                                               |
| IMP  | PR<br>( <i>ka</i> )  | YKUN | <i>y-kun ka-y-xdem</i><br>3M.IMP-be pr-3M.IMP-work<br>'He must be working'<br>(usually/often/ now...)<br>'He will be working' | A probability in a present<br>generic/ habitual/ iterative<br>/ concomitant<br>or<br>A future generic/ habitual/<br>iterative/ concomitant |
| IMP  | FUT<br>( <i>ya</i> ) | YKUN | <i>j-kun ya-j-xdām</i><br>3M.IMP-be FUT-3M.IMP-work<br>'He must be just going to work'<br>'He is just going to work'          | A probability in a close<br>future<br>or<br>A close future                                                                                 |

Regarding the above complex structures, we could conclude that *kan* enriches the verb-system and then the temporal and modal expression in MA. We would pass from a simple verb-system (Table 1, cf.§2) to a complex one (Table 2) with two new grammatical verb-determiners, mutually exclusive:

1. The perfective *kan* would present the event as a reality having taken place in the past.
2. The imperfective *ykun* would present the event as a probability or as a reality in a future (accomplished or unaccomplished).

For as much, can we consider *kan* as at the end of the grammaticalisation process, that is to say at the same stage than *ka/ta* and *va*? Ouali &Fortin (2007:175) have rightly pointed out "that MA complex tense clauses, which consist of an auxiliary (KAN) and a verb stem, are biclausal; both auxiliary and lexical verb are fully inflected for tense and aspect". *Kan* and V2 are both determined by different tense markers in the following examples:

(47) *ka-j-kun ya-j-zi u j-bat<sup>al</sup>*  
PR-3M.IMP-be fut-3M.IMP-come and 3M.IMP-give up  
Lit.: he is in the state he will come and he gives up.  
'He is just going to come and he gives up.'

(48) *mnin t-zi l-d<sup>l</sup>-d<sup>ar</sup> yadi-j-kun-u ka-j-xdam-u*  
when 2.IMP-come at-the-house fut-3M.IMP-be-PL PR-3.IMP-work-PL  
Lit.: when you come at home they will be in the state they are working.  
'When you will come at home, they will be working.'

In (47), *kan* at the imperfective is determined by the present marker *ka* and the imperfective V2 is determined by the future *va*; it results a close future, an intention. On the contrary, in (48) the imperfective *kan* is determined by the future and the imperfective V2 is determined by the present tense marker *ka*, giving a future progressive value. The question which must be asked is the frequency of these types of constructions. However that may be, (47) and (48) show that the two verb phrase's components don't form a "structure of auxiliarity" i.e. a morphological, semantic and syntactic unit.

### 3.5 *kan* and the negation

The present tense marker *ka/ta* and the reduced future tense marker *va* can't be surrounded by the negation (49 and 50) while the full form of the future marker *yadi* is yet surrounded by the negation (51). The linguistic dynamic is tangible here:

(49) *šli ma-ka-j-xdam-f*  
Ali NEG-PR-3M.IMP-work-NEG  
'Ali is not working.'

- (50) *ʕli ma-ʕa-j-xdām-f*  
Ali NEG-FUT-3M.IMP-work-NEG  
'Ali is not going to work.'
- (51) *ʕli ma-ʕadi-f j-xdām-*  
Ali NEG-FUT-NEG 3M.IMP-work  
'Ali is not going to work.'

As for *kan*, two positions are available: in (52), the negation surrounds *kan* and in (53), it surrounds V2. These two positions correspond, for these examples, at two interpretations. In (52), the scope of negation is V2 and in (53), this is *kan*:

- (52) *ħmād ma-kan-Ø-f j-xdām*  
Ahmed NEG-be-3M.PERF-NEG 3M.IMP-work  
*kan- Ø j-tnəzzah*  
be-3M.PERF 3M.IMP-go for a walk  
Lit.: Ahmed was not in the state he works/he is working (...)  
'Ahmed wasn't working; he was going for a walk.'
- (53) *ħmād kan- Ø ma-j-xdām-f u ljum ka-j-xdām*  
Ahmed be-3M.PERF NEG-3M.IMP-work-NEG and today PR-3M.IMP-work  
Lit.: Ahmed was in the state he is not working (...)  
'Ahmed wasn't working and today he is working.'

On this point, we don't agree with Ouali & Fortin (2007: 185) for whom: "There is no semantic difference between the two i.e. the scope of negation does not change (...)." We have tested the examples (52) and (53) with five native-speakers, all have detected a semantic difference between the two examples.

#### 4. Conclusion

We have argued in this paper that the traditional analysis of the unit *kan* as a copula is not relevant in MA. Although it is semantically weak, *kan* is syntactically a full verb, particularly a connective verb, i.e. a bivalent verbal core requiring two arguments. Semantically, it connects the two arguments. In MA, various connections are possible (presentation, existence, localization, possession, attribution). We have presented in this paper some examples regarding the attribution (of a quality or an identity).

We have also argued that *kan*, in the context of a verbal unit – even though it exhibits some auxiliary's features – is not an auxiliary such as the future tense marker *ʕa* or the aspectual auxiliary *ʕa* 'to be just going to'. *kan* doesn't form a "structure of auxiliary" with a second verb i.e. a morphological, semantic and

syntactic unit. *kan* is a bivalent existence-verb governing necessarily a subject and a second argument; the second argument can be a verbal phrase.

We rely here on Bravmann (1953:76) for whom "(...) the exclusively temporal function of *kana* (...) is nothing but a formal and accessory property – accidentally preserved – of a verb originally destined to convey not only the formal notion of time necessarily inherent in every verb, but above all the meaning of 'existence' or 'coming into existence'."

A unified analysis of these two uses of *kan* in MA is necessary. This work is undertaken and will be addressed in future.

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## Against the split-CP hypothesis

### Evidence from Iraqi Arabic

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This paper examines one of the aspects of the cartography program concerned with the CP projection and the validity of positing a multi-layer CP consisting of a variety of semantically relevant functional projections that encode semantic and pragmatic properties of the sentence, (Rizzi 1997). In a language like Iraqi Arabic, data seem to cast doubts on some of the tenets of this hypothesis. The dislocated elements in the left periphery show positional variation and no uniqueness can thus be attributed to any such positions as specific landing sites for topics, focused elements, wh-elements and others. Some of these elements may surface in other positions than their canonical positions in the left periphery. A'-movement, overt or non-overt, to these canonical positions cannot be always motivated, because of the existence of a second landing site or because of some scope conflict. Given these facts, the hypothesis will have to abandon its universality. Its adequacy may be limited to only some languages. Less restrictive approaches to the structure of the left periphery will be more adequate in accommodating the facts in other languages that show free order and iterability of the dislocated elements like Iraqi Arabic.

**Keywords:** Split-CP; Iraqi Arabic; left periphery; focused elements

#### 1. The split-CP hypothesis

These remarks concern the theoretical claims made about the inner structure of the CP projection, what has come to be termed as the split-CP hypothesis, first expounded by Luigi Rizzi (1997). The hypothesis is based on the observation that in natural languages, elements that are closely related to information structure tend to occupy a position at the left periphery of the clause, and that

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functional projections in the left periphery of the sentence. An important point in this connection is whether this order is imposed by UG and whether it is possible for it to be derived from the work of (an)other independent principle(s). This also includes the question of how the surface positions of the elements that are located in these projections reflect their role in the information structure of the sentence. The second issue concerns the assumed uniqueness of these positions as the sites where topics, focused elements, etc. are located in the sentence, and whether we find the elements that occupy these positions in other positions in the sentence as well. If so, then how would this affect the hypothesis that these positions belong to the left periphery? Does A'-movement of elements to these projections provide a solution to the question, and can such movement be motivated for all such dislocations?<sup>2</sup>

This paper provides empirical evidence from IA showing that there is no necessary one-to-one relation between a particular discourse function as force or focus or topic and a particular projection – and hence position. Nor is there any fixed order that these projections assume as the adherents of this hypothesis propose.

## 2. Order in the left periphery

Within the split-CP hypothesis, the architecture of the left periphery has been claimed to be universal, both in its constituents and their order. Alongside this claim comes the fact that natural languages vary in their adherence to this setup. As was said above, Romance languages, exhibit a rich structure on the left periphery where elements encoding different aspects of the information structure assume the order found above in (1). Others don't. One language that appears to share with Italian and other related languages this rich architecture and strict order is Iraqi Arabic. It is a language that displays the dislocations assumed in the hypothesis, and at first glance, it also seems to adhere to the suggested order. On the left periphery of its clause structure, we find dislocated elements: topics,

2. Our concern with movement here, as will become apparent later, is limited to whether it could save the hypothesis at hand in the face of the variation in the position of some of the elements claimed to be principally located in the sentence left periphery. Thus, we will not deal with the major issue of the base-generation vs. movement of the dislocated elements. There is a long line of research on this question in the literature dealing with the differences between the different types of dislocated elements, differences that would justify advancing different hypotheses about their origins, see for example papers in (Shaer et al. 2004).

focused elements, relative pronouns, and *wh*-interrogative phrases occurring in the order suggested in (1) above.<sup>3</sup> The following examples show this.

- (2) a. *l-sajjaara illi mhammad li-ssaa zabuu maa faaf-ha*  
 the-car which Mohammed TO-NOW father-his not saw-3SM-her  
 'the car which Mohammed's father hasn't seen yet.'  
 b. [<sub>ForP</sub> *illi* [<sub>TopP</sub> *mhammad*. [<sub>FocP</sub> *li-ssaa* [<sub>IP</sub> *zabuu maa faaf-ha*]]]]
- (3) a. *mhammad f-itriid minn-a?*  
 Mohammed what-want-2SM from-him  
 'Mohammed, what do you want from him?'  
 b. [<sub>TopP</sub> *mhammad* [<sub>FocP</sub> [<sub>IP</sub> *itriid minn-a*]]]
- (4) a. *samiir li-l-joom ma-jihtfuun wiji-aa.*  
 Sameer TILL-THE-DAY not-3PM-speak with-him  
 'Sameer, they don't talk to him till now.'  
 b. [<sub>TopP</sub> *samiir* [<sub>FocP</sub> *li-l-joom* [<sub>IP</sub> *ma-jihtfuun wiji-aa*]]]

Sentence (2) with structure (2b), shows that the relative pronoun *illi*, being presumably in Spec ForP, occupies an initial position, followed by *mhammad*, the topic in Spec TopP, which is in turn followed by the focused adverbial *li-ssaa*. in Spec FocP. In sentence (3), with structure (3b) we have *mhammad* the topic, occupying the Spec TopP, followed by the *wh*-element *f*, in Spec FocP. Sentence (4), with structure (4b) exhibits another example of a topic and a focused element in the proposed order. *samiir*, the topic, occurs to the left of the focused adverbial *li-l-joom*. In all the three examples such elements are located at the left-most side of the sentence, followed by the IP (or TP) component exhibiting the SVO structure of Iraqi Arabic.

There are, however, two questions that arise here concerning the proposed order. The first is: why should this strict order be stemming from a universally designed architecture of the left periphery, i.e. the pre-determined movement of elements to specific semantically interpretable positions ordered by some optimal structure blueprint with a Universalist tag? What if it could be shown to follow from other independent principles or constraints on movement? In fact, the suggested order has been argued by Newmeyer (Newmeyer 2008) to stem in many cases from such principles as the Nested Dependency constraint, which states that "filler-gap dependencies may be disjointed or nested but not intersecting" (Fodor 1978: 448), and the condition that the head noun and the relative pronoun should

3. In the transcription of the sentences bold type is used for focused elements to distinguish them from other non-focused elements. In the English gloss the focused elements are indicated by the use of the Upper-case characters.



Sentence (10) contains the focused PP *bilbeet*, and the *wh*-element *il-man*.<sup>6</sup> The hypothesis at hand considers both elements as focused elements, hence they will have the same landing site, i.e. FocP. But this would be in violation of the proposed architecture of the functional projections in the left periphery, since it posits one Focus projection, as seen in (1) above. The phenomenon of having more than one dislocated element of the same type in one sentence is not limited to Iraqi Arabic though. It has been attested in many other languages, and was therefore accounted for by subsequent modifications of the original proposal by positing two Focus projections in the left periphery, each locating a different type of focused elements.

Many of the modifications on Rizzi's original proposal of the split-CP hypothesis were in this vein, either postulating multiple projections of the same type, e.g. Topic or Focus projections, or positing different projections for those that were initially grouped into one type and located in one projection.<sup>7</sup> More than one Focus projection were proposed and the argument for this proposal is that these various Focus projections locate elements that are not exactly semantically similar. The projections themselves are now differentiated in terms of the aspect of information structure that they encode, and hence the one-to-one relationship between position and meaning mentioned above is preserved. We may thus propose that Iraqi Arabic has two Focus projections in its left periphery.

However, here we will encounter a further problem. It is the fact that the order of the two elements in the left periphery can be reversed. We may equally have (11):

- (11) *il-man b-il-beet fift ?*  
 to-whom IN-THE-HOME saw-2SM  
 'Who did you see at home?'

This shows that even when we have admitted two focus projections in the left periphery, we won't be able to determine any semantic difference between them that may eventually restrict the subcategory of the focused element that occupies each. They can be occupied by either of the two types of focused elements. Hence,

6. A distinction needs to be made between two possible readings for this sentence depending whether the PP *bi-l-beet* 'at home' is a topic or a focused element. The two are distinguished intonationally. As a topic, it is usually separated by juncture from the following 'comment', while as a focus it takes a contrastive stress. In the example above, we are asking about who you saw at home and not in the office.

7. Rizzi (2004), for example, proposes a separate Int projection for some interrogative elements, and Belliti (2001) proposes more than one FocP to accommodate different types of focus, e.g. contrastive focus, *wh*-interrogatives, question answering focus.

the one-to-one relationship between position and interpretation cannot be retained.

The last question that may be raised in this connection is the extent to which the order of the elements in the left periphery reflects their role in the information structure of the sentence. Here, it seems that there is an obvious disparity between the two: the syntactic position, of such elements and their contribution to the information structure. The above sentences show that such elements as relative pronouns and *wh*-questions do appear in the sequence suggested in Rizzi's hypothesis; relative pronouns occupy Spec ForP, and that interrogative *wh*-pronouns occupy Spec FocP.

However, this will obliterate the fact that relative pronouns are generally thought of as topics, and should therefore be located in Spec TopP, and not in Spec ForP as is assumed in this proposal. It will also neglect the fact that the interrogative *wh*-phrases signal the illocutionary force of the sentence they occur in, as a question and not a statement, and should, therefore, be located in ForP, which is the projection that types the illocutionary force of the sentence, according to this hypothesis. This projection is assumed to constitute the highest layer of the CP cartography, and in the case of questions, its head has a [+wh] feature attracting the interrogative *wh*-phrase. If it does, then the *wh*-phrase will have to move to ForP, and not to FocP as is assumed by our hypothesis. The hypothesis at hand seems to favor the syntactic position that these elements assume over any consideration of what constitutes the appropriate projection for their information structure role.

### 3. Focused elements in-situ

The second issue is that of the uniqueness of these positions in the left periphery. According to this hypothesis, elements which appear in a sentence-initial position are supposed to have moved to the relevant functional projection in the left periphery from some original position inside the sentence. And since movement is obligatory within this model, the movement of these elements is triggered by particular features that the functional projections have. The sentences above show the focused elements located in a sentence-initial position, a result of the presumed A'-movement to FocP. However, not all focused elements in IA appear in this canonical position in the left periphery. They could appear in their original positions inside the sentence as well, a fact that is shared by many other languages.

- (12) *fift hind b-il-beet l-baarha*  
 saw-1s Hind in-the-home THE-YESTERDAY  
 'It was yesterday that I saw Hind at home.'

- (13) *mhammad iftira qamiis<sup>f</sup>*  
 Mohammed bought-3SM SHIRT  
 'Mohammed bought a shirt (and not something else).'

For such in-situ focused elements that surface in their clause-internal positions it is, of course, possible to devise a covert movement at LF. Such LF movement will non-overtly raise the focused element to the Spec of the proper projection in the left periphery. This LF movement is necessary in such cases in order to ascertain the right interpretation. But can this LF movement be maintained for all cases of in-situ focused elements? The wide range of elements that can be in focus would require this LF movement, if it is to be maintained, to move anything from anywhere. It would have to be totally unconstrained in order to raise the focused elements from positions where extraction is impossible. For example, it will be able to extract elements from within syntactic islands, or move non-maximal projections, etc... This will raise doubts as to whether an LF movement can be motivated for some of those cases of in-situ focused elements. In the following sentences we may find focused elements for which no such movement can be evoked, because they are not maximal projections (14), or are constituents of a conjunction phrase (15), or are within a complex NP (16).

- (14) *mhammad iftira l-qamiis<sup>f</sup> l-hariir, muu l-riibaaf<sup>f</sup> l-hariir*  
 Moh. bought-3SM THE-SHIRT the-silk, not the-tie the-silk  
 'Mohammed bought the silk shirt and not the silk tie.'
- (15) *zakal xubuz w dzibin, muu xubuz w geemar*  
 ate3SM bread and CHEESE, not bread and cream  
 'He ate bread and cheese, not bread and cream.'
- (16) *l-iktaab zilli iftira-a sali tfaan yaali*  
 the- book which bought-it ALI was-3SM expensive  
 'The book which Ali (and not Ahmed) bought was expensive.'

Furthermore, these focused elements may be discontinuous like in (17), or even affixes as in (18).

- (17) a. *laa, sali iftira mazrasa.*  
 no, ALI bought-3SM FARM  
 'No, Ali bought a farm.'

In response to the question

- b. *mhammad iftira beet?*  
 Mohammed bought-3SM house  
 'Did Mohammed buy a house?'
- (18) *juqus<sup>d</sup>-uun il-musalm-aat, muu l-musalm-iin.*  
 mean-3P the-teacher.PLU-F, not the-teacher.PLU-M.  
 'They mean the female teachers, and the male ones.'

The movement here violates all known constraints on movement.. But then, this is the only way available for us to get the interpretation of the sentence right, within the theoretical framework that the Split-CP hypothesis is set.

#### 4. Pre-verbal focus position

To complicate things further, in some languages, IA amongst them, focused elements may be found in positions that are specifically reserved for such elements but which are situated lower in the sentence architecture than the CP. In Iraqi Arabic, a SVO language, there is a well-defined syntactic Focus position for focused elements to be in. It is the position that comes immediately to the left of the verb. Thus we have

- (19) a. *mhammad l-joom wis<sup>f</sup>al.*  
 Mohammed THE-DAY arrived-3SM  
 'It was today that Mohammed arrived.'  
 b. [<sub>IP</sub> mhammad [<sub>VP</sub> [<sub>FocP</sub> .. l-joom<sub>i</sub>] [<sub>VP</sub> wis<sup>f</sup>al e<sub>i</sub>]]]
- (20) a. *zajnab bluuz iftirat*  
 Zaynab BLOUSE bought-3SF  
 'It was a blouse (and not a skirt) that Zaynab bought.'  
 b. [<sub>IP</sub> zajnab [<sub>VP</sub> [<sub>FocP</sub> .. bluuz<sub>i</sub>] [<sub>VP</sub> iftirat e<sub>i</sub>]]]

If movement is designed so that it targets a projection with a head carrying a specific movement-triggering feature, then a Focus projection will have to be added to the sentence structure in this pre-verb position for focused elements to move into from a variety of post-verbal positions, perhaps in a similar fashion to (19b) and (20b).

However, this Focus projection will not be part of the sentence left periphery, and hence, not part of those projections that are canonically assigned the locus of the various aspects of information structure. Although this constitutes a problem for the orthodox cartography of the semantically relevant projections expounded in the hypothesis under question, it shouldn't do at the more general level of requiring movement to be semantically interpretable. We could suggest that this pre-verbal position is the semantically relevant functional projection that constitutes the landing site of the focused elements in this language. It contains a feature that motivates their movement. The only difference it has from the original proposal that we are discussing is that it is not within the left periphery of the sentence, not a component of the CP shell, if you like. Thus, in some languages like Iraqi Arabic, we may have two Focus projections – FocP – situated at different locations but similar in attracting focused elements into them.

This will now raise the question as to the accuracy of such a restrictive frame that the split-CP hypothesis proposes. We may ask about the justification behind positing two Focus projections at different locations in the sentence architecture. Here one may suggest, like Belletti (2001), that the two Focus positions exist to cater for two different types of focus. So, from the point of the unique relation between position and interpretation there shouldn't be any problem in positing two Focus projections. However, this can only be justified to the extent that the focused elements show semantic difference. I find nothing in their interpretation that suggests that. The picture is that of two projections identically defined semantically, to which elements may move, in the same language; a strange state of affairs within the framework of the Split-CP hypothesis which stresses the one-to-one relationship between position and interpretation.<sup>8</sup>

Furthermore, scope facts will raise a further question about the location of this pre-verbal Focus position. In sentences (19) and (20) above, we find that the focused elements which are located to the left of the verb have scope over the entire sentence. This is informally indicated by their English translation. As such, the focused element should be located higher up in the sentence to get the c-command relationship conventionally required for its wide scope. For this c-command relationship to obtain, we will have to resort to a subsequent covert (LF) movement of the focused element from this pre-verbal Focus projection to the canonical Focus projection in the left periphery, taken as the locus of the dislocated focused elements earlier. This is similar to the one we suggested for the in situ-focused elements, but now it is from another, intermediate position, a position syntactically specified as a locus for focused elements, and hypothesized as a Focus projection. We are now before a case of having two movements, one overt, to a pre-verbal position, and another, a covert one, to the sentence left periphery to get the scope facts right.

But to say so will have serious implications on the hypothesis that movement is linked to semantic interpretation or has semantic motivation. If the final target of the focus movement is to the canonical FocP in the left periphery, then the first (overt) movement of the focused element to the

8. An anonymous reviewer suggests that pre-verbal movement of objects like what is found in (20) may be analyzed as a case of object shift and that focusing in this case would be a feature of whatever head that the moved object occupies its Spec, often assumed to be Spec *v*P. While this is perfectly possible, it will cause problems for one of the basic tenets of the Split-CP hypothesis since it will open the encoding information structure of the sentence to other projections than those that were assigned this role by the hypothesis and which are specifically identified with the relevant semantically interpreted features. In other words, there won't be any need for a specific Foc P, or Top P, etc. This is actually what the paper is arguing for.

preverbal position is only an interim step that is deprived from any semantic motivation. The landing site is only a syntactic middle-of-the-road slot. Thus, in its overt movement, the focused element does not move to the Specifier of a projection that is semantically identified. It is the second, covert, movement which does. No semantic motivation can really be given to the first movement. An overt movement to an intermediate position, will be in conflict with one of the basic requirements of movement within this hypothesis, i.e. that it should be semantically interpretable.

## 5. Conclusion

We have seen that a language like IA can hardly be taken to conform to the original layout of the left periphery posited structure. But, this, in itself, should not constitute a problem. Nevertheless, the license that Iraqi Arabic gives to the elements in these semantically relevant projections to reverse their order seems to cast doubt on the validity of the design. If we can have a topic coming to the right of a focused element as well as occupying the expected higher position then what motivation can we preserve for a solid fixed structural hierarchy?

On the other hand, the fact that in this language certain of these elements, i.e. the focused elements, may optionally appear in-situ or dislocated in a position other than the canonical left periphery landing site raises serious questions about the uniqueness of this position. The hypothesis assumes that the locus of focused elements is FocP that is part of the CP cartography, a projection that encodes this aspect of information structure. The movement of these focused elements, which is needed to save the hypothesis, has been seen to lack sufficient justification. In certain instances, extraction is impossible because it violates the syntactic constraints on movement. This was the case in presumed LF movement of some in-situ focused elements to the canonical focus site at the left periphery. In other cases, the movement is not semantically motivated as in the case of the overt movement to the intermediate pre-verbal position that focused elements sometimes show at, and which is necessarily followed by a covert one to the left periphery.

In fact, the argument for movement is further weakened when we consider the difference in the presumed movement of focused elements and that of topics. The movement of focused elements and that of the *wh*-interrogative phrases create an operator-variable relation that is so essential in LF movement. The movement of topics doesn't. Dislocated focused elements give rise to weak crossover effects while topics don't (Lasnik & Stowell 1991). Two more differences can be mentioned between these two types of dislocated elements in IA. These are the sensitivity

to syntactic islands in the case of moved focused elements, and the presence of resumptives in the case of topics and their absence with focused elements. This may be seen as a reflection of the difference in the extent of syntactic connectivity to their clauses. Consequently, the validity of positing the same analysis – i.e. movement- for the dislocation of the two is put to question.

This seems to direct us towards the relaxation of the tenets of this hypothesis, probably to abandon the universality of the proposed CP structure. Dislocation in the left periphery in some languages may support an analysis that assigns unique positions in the C domain for the dislocated elements. But the same analysis may not fare so well with others. For languages that do not preserve a strict order of dislocated elements, positing such unique positions is inadequate and alternative proposals must be sought.

The study of left dislocation has been the focus point of a long line of research, and several analyses of varying claims of generality have been proposed. These also varied in terms of how they viewed the process leading to the dislocation of the different elements: movement from a clause (IP)-internal position to the left periphery, or base-generation of these elements in their surface positions. There are even suggestions that focus should not be treated as part of proper syntax and that it should be dealt with as part of the phonology (Reinhart 1997).

For languages like IA, which do not observe a strict order and exhibit iterability of dislocated elements of the same type, an analysis that depends on free placement of the dislocated elements will be more adequate. For example, If recursion in the CP structure is allowed, it will create the necessary loci for the moved/base-generated elements without any need to specify the individual C-projections with unique functions (Authier 1992). Adjunction of left-dislocated elements in the CP domain, along the lines suggested in Lasnik and Saito (1992), is available too. These approaches do not place high restrictions on the number or order of dislocated elements in the left periphery and will ensure the freedom of occurrence of the various dislocated elements at varying levels of the CP structure.

An analysis of dislocation in the left periphery in IA will have to take into account all the rich intricacies of this phenomenon and the differences between the various dislocated elements. It may have to provide independent analyses to each of the dislocated elements depending on their different syntactic properties. Some, like the focused elements with their prosodic properties, may be dealt with in the PF interface and removed from narrow syntax. But given the objections raised in this paper against a restrictive approach like the split-CP hypothesis, it will generally be based on less restrictive approaches like the ones just mentioned.

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PART III

**Language acquisition, learning & contact**

**2nd proofs**

# Probability matching in Arabic and Romance morphology

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This study investigates the role of probability matching in the selection of morphological lexical representations by adults. Whereas children rely on application of a *morphological default* that results in *regularization*, adults *match probabilities* with pre-existing lexical distributions. This hypothesis is supported with a series of case studies involving grammatical *gender* assignment to *loanwords* from *Arabic* to Iberian *Romance* and vice versa, and *pluralization* in *second-language acquisition* of Arabic.

## 1. Introduction\*

Morphological properties of nouns may be underdetermined. Such indeterminacy may arise due to a lack of evidence in linguistic input (ambiguity). Alternatively, even when such evidence exists, speakers may be unable to take full advantage of it, due to being second-language learners, or loanword borrowers with insufficient knowledge of the source language. In such situations, how does a speaker arrive at a lexical representation with complete morphological specifications?

I argue that speakers are guided partly by morphophonological generalizations about the phonotactics of the language. In addition, they learn and use information about the relative probabilities of morphological variables. Incoming lexical items are then treated in such a way as to *maintain the pre-existing probability distribution* of these morphological variables. This may be the borrowing language,

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in the case of loanwords, or the second language, in the case of acquisition. In the latter case, the appropriate distribution is learned relatively early, *before* accurate acquisition of many individual lexical items.

Alternative accounts of representational selection – including favoring the maximally derivationally transparent option through *lexicon optimization*; markedness-driven selection of a default; or random choice among variables – fail to capture the observed pattern of probability matching. Likewise, selection seems to have little to do with semantic and phonological properties of the forms in either the source language or the borrowing language, beyond an initial gross litmus test of a generalization (and none to do with the generation of exceptions in order to conform to the distribution).

Such behavior has been previously observed with respect to phonemic feature specifications. Consider a hypothetical final-devoicing language with surface forms *at* and *op*. The corresponding underlying representations may be either /ad/ or /at/, for the first; /ob/ or /op/, for the second. Morphological alternations, such as suffixation of vowel-initial suffixes, typically decide the issue. When such information is lacking in the language, however, or has not yet been encountered by the speaker/learner, other means must be employed.

Probability matching predicts variable assignment of underlying voicing to the final segment, according to the pre-existing, language-specific phonotactic probability of voicing for that place of articulation and that position in the word. Numerous studies show that speakers do prefer nonce words that conform to distributional patterns of their native lexicons in rating tasks (e.g. Zimmer 1969, for Turkish harmony; also Frisch & Zawaydeh 2001). This suggests that they might also be guided by these preferences when assigning underlying representations.

Lexicon optimization, in contrast, predicts consistent selection of underlyingly *un*voiced final consonants, to maximize identity between the underlying representation and the output. Markedness may make different predictions for different segments, depending on the ones involved. The existence of emergence of the unmarked effects provides some evidence for the influence of markedness considerations where grammars are otherwise uninformative. If language-specific patterns were found in UR choice, however, this would militate against a strong role for universal markedness considerations in their selection. Random guessing, finally, would result in an even distribution between the two voicing alternatives.

Precisely this sort of case has been investigated for two different devoicing languages, Dutch (Ernestus & Baayen 2003) and Turkish (Becker et al. 2006). In both experiments, speakers of the language in question were prompted with finally-devoiced forms of nonce words, and asked to produce an inflected form of the nonce stem in which a vowel-initial suffix could induce a voicing alternation.

The task forces a representational choice and reveals the choice, since the elicited form includes the underlying voicing specification of the segment in question.

In both cases, the authors found that speakers do *not* take the chance to make their lexicon more transparent, and assign voicelessness to phonemes that must in at least some output forms surface as voiceless. In Dutch, underlying voicing is selected 24% of the time overall. In Turkish, voiced phonemes were chosen 38% of the time overall by adults (much less so for children, revealing a regularizing bias for them, as will be discussed further). Thus for neither language did selection fall exceptionlessly into the voiceless category, as predicted by the Lexicon Optimization account. These experiments reveal that in at least some cases, speakers posit representations that differ from surface outputs, *even when it is unnecessary for them to do so*.

Neither were selections evenly distributed between voiced and voiceless specifications. Thus the random guessing strategy appears not to be active. Rather, the percentage of voiced final consonants varied according to the place of articulation of that consonant. For each language, those percentages roughly reflect the *relative probability* of voiced final consonants in the lexicon.

Importantly, this behavior contrasts with that of children, who are well-known to overregularize in the course of the acquisition process. In a series of studies comparing the behavior of children and adults in artificial language learning experiments, Newport and colleagues (Hudson Kam & Newport 2005, Wonnacott & Newport 2005) find that when confronted with variable linguistic input, adults reproduce that inconsistency in probabilistic fashion, whereas children innovate via regularization.

The pair of studies outlined above focuses on experimental tests of segmental properties of speech sounds. In what follows, I extend the domain of investigation to morphology and to more naturalistic speech domains. Specifically, I will address morphological gender assignment to incoming words in the real-world situations of language contact and second-language acquisition. This involves presentation of diachronic data on loanword borrowing, beginning with Arabic loanwords into Spanish. The Spanish results are bolstered by additional data from Portuguese, and by two experiments with native Spanish speakers. The subsequent section examines loanwords going in the opposite direction – from Romance (primarily French) into Moroccan Arabic. The data-driven component of this paper concludes with an examination of the time course of pluralization in second-language acquisition of Arabic.

In each case, adult speaker behavior reveals the use of probabilistic information in assigning gender or plural pattern. In the final section, I present a model of how such calibration occurs, incorporating gradience (à la Boersma & Hayes 2001) into an optimality-theoretic model of morphological category assignment

(following Rice 2006). I conclude that morphological assignment occurs in accordance with lexical statistics.

## 2. Gender assignment in Arabic to Iberian Romance

Arabic is the source of a large number of Spanish lexical items, with the percentage of the Spanish lexicon of Arabic origin at one time reaching at least 5% (Viguera Molins 2002). Contact between the two languages began with the Arab conquest of much of the Iberian peninsula in the 8th century. This linguistic coexistence diminished over time and was abruptly curtailed with the fall of the final Muslim principality of Granada in 1492, and the subsequent expulsion and persecution of the Arabic-speaking Spanish community. Most loans from Arabic into Spanish, then, predate this time.

Despite large-scale borrowing and the centuries of linguistic coexistence enjoyed between the two languages, however, the degree of bilingualism among borrowers of Arabic words appears to have been small. One piece of evidence for this conclusion is that Arabic words were typically borrowed intact into Spanish with the Arabic prefixal definite article /al/ still attached to the head noun (Odisho 1997), rather than as the independent stems that more informed borrowers might be expected to import. This circumstance also means that a very high percentage of the noun borrowings begin with /a/.

This section considers the loanword treatment of Arabic words borrowed into Spanish with initial /a/. I begin with an extended discussion of gender assignment in Spanish, and what outcomes might be expected from such borrowing. I then sketch the corresponding information on Arabic gender, before reporting the methods and results of the loanword study. The Portuguese results corresponding to the Spanish ones are then reported. Finally, two synchronic studies of Spanish speakers' treatment of a subset of the original loanwords, and of a set of nonce words, are discussed.

### 2.1 Gender in Spanish

Spanish nouns may be either of feminine or masculine gender. Feminine gender is often associated with a suffixal *-a* vowel, though there may be no suffixes or some other typically feminine one such as abstract *-dad*. In addition, *-a* final masculine words also exist, many of which are borrowings from Greek (e.g. *drama*). Masculine gender may be indicated with a final *-o* suffix, but may also show no suffix at all, and are associated with a much wider range of endings. Articles and adjectives agree with the noun, as shown below:

- (1) a. *la profesor-a guap-a*  
the-F professor-F goodlooking-F  
b. *el profesor guap-o*  
the-M professor goodlooking-M  
'the goodlooking professor'

#### 2.1.1 Patterns in Spanish gender

A substantial literature investigates the phonological and semantic patterns associated with Spanish gender. Bergen (1978) summarizes the findings of studies prior to his publication date, particularly from pedagogical sources. He lists the following factors as previously claimed to be conducive to masculine gender:

- (2) Properties associated with masculine gender in Spanish
- Semantic: inherently male, countries, districts, divisions of territory, rivers, oceans, seas, mountains and mountain chains, cities, towns, villages, numbers, days of week, months of year, ships, geographical directions; also, electrical tools (Pountain 2006)
  - Grammatical: infinitives, phrases, indeclinable words (e.g. *si* 'yes'), compounds
  - Etymological: Greek origins ending in [*ma, ama, ema, oma, pa, ta*]
  - Phonological:
    - final phoneme one of [l o n e r s],
    - final stressed syllable, especially ending in [r] or [l] (except with [ie] nucleus),
    - monosyllables, except z-finals
    - words with stressed diphthongs
    - infrequent words with stressed [a] in the initial syllable

Masculine is clearly construed as the default, as is explicitly stated for some of the considerations (e.g. any terminal phoneme except...). The following is the (much shorter) list of factors conducive to feminine gender:

- (3) Properties associated with feminine gender in Spanish
- Semantic: inherent gender, alphabetic letters
  - Phonological:
    - frequent words w/stressed [a] in the initial syllable
    - most words w/stressed [ie], some w/stressed [ue]
    - ending in one of the following orthographic segment strings:  
*a, d, ad, ud, dad, tad, tud, ion, cion, sion, tion, xion, is, sis, it, is, umbre, ie, z, iz, ez*

Bergen cautions against overreliance on the semantic factors in favor of the phonological ones, and condenses the exhaustive list of generalizations above culled from the literature into two semantic rules (referring to masculine and feminine inherent gender, respectively) and eight phonological ones. A more recent argument of similar kind is put forward by Eddington (2004), who provides an analogical model that attains 95% correct gender assignment simply by following the rule that *words are masculine except when ending in one of the following orthographic segment strings: -a -d -cion -sion -tis -sis*. Eddington also evaluates previously-proposed gender-determining factors and systems, most of which are far more complex even than Bergen's list (with over 20 stipulations), and none of which perform as well (the best of them reaching a 93% success rate). A follow-up elicitation experiment compared the analogical model's performance with that of human subjects, finding that they mirror each other closely in their patterns of gender assignment.

Like Eddington, I argue that complexities like those outlined above are largely incidental in gender assignment. Speakers assign gender based on other factors, which may override those listed above even when they are present. One such factor is a tendency to maintain the relative proportions of morphological categories such as gender. The proposed effect of probability matching for novel forms is a novel contribution.

### 2.1.2 *Experimental investigations of Spanish gender*

Acquisition and elicitation studies show both that phonological properties are most relevant in gender assignment (compared to semantic ones; Natalicio 1983) and that most child learner errors are made with words *not* ending in the gender-associated vowels [o] and [a] (Brisk 1976; both cited by Eddington). Smead (2000) finds that for anglicisms borrowed into Chicano Spanish, inherent gender and the presence of final [a] or [o] results in across-the-board categorical gender assignment, whereas variable factors are other final phonemes, gender of a synonym, and gender of the hyperonym, or supercategory.

Smith and colleagues (2003) and Perez-Pereira (cited by Smith) confirm that children pay more attention to phonological than semantic cues in assigning gender. They find further that masculine-cued words are produced more accurately than feminine ones, that masculine is more often assigned than feminine is to ambiguous words, and that more masculine than feminine forms are produced by children in the earliest stages of language acquisition. (Brisk (1976) also documents more errors by children for feminine than masculine words). This difference is attributed to the fact that while 'regular' (-a ending) feminine nouns are slightly more frequent than 'regular' masculine ones, 'irregular' masculine ones

outnumber irregular feminines by two to one. This greater variation results in the use of masculine as default in their connectionist model (see also the argumentation of Boudelaa & Gaskell 2002 with respect to Arabic plurals).

Thus considerable experimental evidence points to the status of masculine as the default gender of Spanish. Prado (1982) argues the same case, making some of the arguments used above and introducing others:

- (4) Arguments for masculine as a Spanish gender default (Prado 1982)
  - a. masculine forms outnumber feminines, if not by much (19,500 to 17,300 Ns respectively, by his count)
  - b. virtually all borrowed nominals are masculine, except when from other Romance languages when they retain the source language's gender
  - c. more restricted range of endings for feminine
  - d. nominalized infinitives and adjectives are masculine
  - e. nondeclinables are masculine
  - f. participials are always masculine (ha comprador, \*comprada 'I have bought')
  - g. compounds are almost always masculine
  - h. many masculine derivational suffixes are unmarked with -o, though feminine counterparts must take -a
  - i. many feminine forms are derived from masculine bases
  - j. derived forms from feminine bases often take masculine instead of feminine, e.g. *calleja~callejon*, \**callejona*
  - k. article allomorphic alternation in which feminine nouns take masculine-form articles in phonologically restricted cases (discussed further below)
  - l. historical change from feminine to masculine of -e and -r final forms. Now 89% of e-finals are masculine (5% feminine, 5% ambiguous), and 99% of r-finals

Not all of Prado's arguments are convincing. The first of them, positing relative masculine frequency, is belied by the Lexesp corpus of modern Spanish (Sebastián et al. 2000), which shows noun types equally divided with respect to gender, 50% masculine and 50% feminine. The second claim, about loanwords, is likewise not supported by this paper. However, taken in combination with the experimental evidence, one can safely claim on the basis of these points that if there is a gender default in Spanish, it is masculine.

### 2.1.3 *Article allomorphy in Spanish gender*

Morphological gender in Spanish, as expressed by the agreement of the definite article, is subject to allomorphy in certain contexts. This allomorphy stems from

a productive hiatus-resolving restriction affecting the singular definite article (subject to certain lexical exceptions and cyclic effects). When the noun begins with a stressed /a/ vowel, and the definite article immediately precedes it, the masculine form of the article is used, regardless of the noun's grammatical gender (Harris 1987).

- (5) Singular definite article allomorphy: la (F) → el (M) / \_\_\_ [N.á...]

The examples below demonstrate the alternation.

- (6) Article allomorphy in Spanish

- a. *el* *águ*a *\*la* *águ*a  
 the-M water  
 'the water'
- b. *el* *águ*a *suci-a* *\*el* *águ*a *sucio*  
 the-M water dirty-F  
 'the dirty water'
- c. *la* *mism-a* *águ*a *\*el* *misma* *águ*a, *\*el* *mismo* *águ*a  
 the-F same-F water  
 'the same water'

Adjectives agree with the underlying gender, regardless of the expression of the article, and a sequence of final /a/ + initial stressed /a/ is still permitted when the preceding word is not the article (i.e. not within the prosodic word). Initial unstressed /a/ does not result in this alternation in modern Spanish (that is, from the 1500s onwards). In earlier stages of the language, article alternation did apply more generally to initial vowels, regardless of stress and in some cases, regardless of vowel quality (Penny 2000; at some times and regions, also for any initial vowel and for other determiners, per Rosenblat).

The relevance for the current study is that in at least some contexts, the set of loanwords considered – those beginning with the vowel /a/ – obligatorily surface with masculine gender as expressed through the definite article. Therefore, an approach favoring maximal transparency, such as lexicon optimization, predicts that their preferred representation should be masculine as well.

#### 2.1.4 *The Arabic source forms*

The Arabic gender system is in many ways isomorphic with that of Spanish. It also assigns both feminine and masculine gender, and the primary morphological exponent of feminine gender is a final /a/ vowel (phonemically; depending on context and dialect, it may surface as /e/ or schwa). To a greater extent than for Spanish,

however, this association is non-deterministic. Final /a/ may denote morphological unithood rather than grammatical femininity, for example (Wright 1996). Also as in Spanish, adjectives agree with nouns in gender, at least for the singular (though the form of the article is constant and does not agree in this respect). In sum, then, the languages share a binary system of grammatical gender, in which feminine is the more marked case, often associated with a final -a.

The degree to which other semantic and phonological considerations might be relevant in gender assignment is even less clear than for Spanish. This is particularly true for Spanish borrowers, who are presumably unaware of such nuances. Lack of borrowers' fluency in Arabic should minimize the influence of these nouns' gender in Arabic itself on borrower behavior. Being unaware of the Arabic gender leaves the field clear for them to use one of the four strategies outlined in the introduction in making their decision.

#### 2.2 Arabic loanwords in Spanish

Arabic loanwords in Spanish<sup>1</sup> were classified as masculine or feminine using the dictionary of the Real Academia Española (henceforth RAE). In addition, searches were carried out for each noun in a historical online corpus of Spanish (Davies). Although the Davies corpus does not explicitly tag nouns for gender, it does provide the context in which items appear in the corpus texts, allowing the inference of gender based on actual usage and agreement with neighboring forms. Gender was considered unambiguously established only for nouns which cooccurred with an agreeing item other than the definite article or with a non-adjacent definite article. Alternatively, a noun with unstressed initial /a/ and an attestation later than 1500 was also considered sufficient if attested only with the definite article. This is because in later Spanish, the article does disambiguate for such unstressed initial /a/ vowels (see 2.1.3).

1. A corpus was compiled of all the /a/-initial Spanish nouns of Arabic origin that are identified as such in the etymological dictionary of Corominas and Pascual (1997). This results in a set of 453 candidate nouns. The set was restricted to only forms that are /a/-initial in Spanish for a number of reasons. Primarily, the article allomorphy applies only to them, so the lexicon optimization argument applies only to them. Also because of this, they might be expected to behave differently in any case. Second, a-initial loanwords are already the vast majority of the entire loanword corpus, since most words were borrowed with the a-initial definite article prefix intact. Third, methodologically, such loanwords are simply much more easily isolated and identified in etymological dictionaries. Finally, this restriction to /a/-initials yields a more phonologically homogeneous test pool, in a way that should not affect the hypotheses being tested.

Twenty-four nouns remained indeterminate with respect to gender, leaving a set of 438 nouns. Of these, 245 have supporting evidence based on the Davies corpus. The gender percentages are exactly equivalent between the full set of 438 and the corpus-supported subset of 245, so details are provided only for the full set below.

Of the 438, 175 are feminine and 263 are masculine, so that the overall percentage feminine is 40%. Within the set of feminine nouns, all but six forms end in a final /a/ vowel in Spanish.<sup>2</sup>

The set of nouns which are borrowed as masculine into Spanish shows a far greater variety in their phonological form at word end. Some end in phonotactically licit final consonants for both languages (primarily /n, r, l, s/). The largest single group ends in the vowel /e/, which is the epenthetic vowel in Spanish and is often warranted due to Arabic final consonant clusters impermissible in Spanish. Twelve forms did add a final /o/ in Spanish, making them appear more canonically masculine, four of which are human-male (*algarivo*, *algavaro*, *abalorio*, *alborozo*, *almuédano*, *asesino*, *azulejo*, *aljemifao*, *abelmosco*, *albarazo*, *albérechigo*, *alfónsigo*, *almarjo*).<sup>3</sup>

As expected for a default category, then, the masculine forms show greater variation and are subject to less modification than the feminine exceptional ones. Those few which do have a feminine-associated final /a/ in the source language may lose it, though not necessarily. Rarely, the canonically masculine /o/ suffix is affixed, though not to the same extent as the feminine /a/, and for a quite restricted semantic range (human-male).

As for the feminines, we saw that nearly all (except 6 of 175) have a final -a in their eventual Spanish form. However, this -a does not always have a correspondent

2. The exceptions include two forms that end in a potentially pluralizing /s/, and three with the usual epenthetic /e/ (*azumbre* 'liquid measure'). The sixth form involves an unexpected change from the Arabic form to a segmental sequence homophonous with the Spanish feminine suffix *-ion* (Ar. *siyuur* → Sp. *acion* 'saddle piece from which stirrup hangs'). The phonological change of /r/ to /n/ is not expected, as both segments exist in Spanish, and the lack of other phonologically similar loan source forms means that the generality of this change for such a segmental string in particular, cannot be tested.

3. Two (*ajimez*, *alamar*) have a final /a/ in Arabic, which has been unexpectedly lost. Four more Arabic final /a/ words were borrowed directly as such and are attested as masculine in Spanish in the Davies corpus, (two are human-male; though some variation may have existed, as they are all classed as feminine in the Real Academia dictionary; *adafina*, *albacea*, *almádena*, *almofalla*). A fifth final /a/ form (*álgebra*, Arabic *jabr*), is now canonically masculine but continued to fluctuate in gender until the 20th century (in the Davies corpus, 10 feminine attestations and 17 masculine through 1900).

in the Arabic source form (to an even greater degree than for the unexpected final -o for masculines).

For those forms which do end with /a/ in Spanish, the majority also show a final /a/ in Arabic. But there are several surprising exceptions, listed below in Table 1. Spanish forms are given in normal (phonemically transparent) Spanish orthography.

Table 1. Exceptions to Arabic /a/-final feminine loanwords in Spanish

| Spanish   | Arabic (in IPA)                 | Gloss of Spanish form                     |
|-----------|---------------------------------|-------------------------------------------|
| azotea    | sut'ayh                         | building covering; human head             |
| atalaya   | t'alaazis (dialectal t'alaayis) | tower or elevated place                   |
| arracada  | ʔaqaat <sup>6</sup> (plural)    | earrings                                  |
| almarada  | mixraz                          | iron weapon point or needle               |
| alhóndiga | funduq                          | market, warehouse (modern use=hotel)      |
| alforja   | xurj                            | type of carrying bag                      |
| alcarraza | karraaz                         | cooling container                         |
| alcaparra | kabar                           | caper (herb)                              |
| aduana    | diwaan                          | customs                                   |
| adárgama  | darmak                          | type of flour                             |
| ajaquefa  | ʃiqaaf                          | upper part of a building; iron decoration |
| albenda   | band                            | patterned white hanging cloth             |
| alharma   | harmal                          | type of plant                             |
| almijara  | maʒjal                          | oil deposit                               |
| atafea    | tafaḥ                           | indulgence to excess                      |
| almartaga | martak                          | meaning unclear                           |

In general, then, a final /a/ in the Arabic source form results in feminine gender assignment to that form by Spanish borrowers, and other forms are borrowed as masculine. However, there is an additional significant finding that final /a/ is applied, in conjunction with feminine gender, unexpectedly to a selected number of feminine loanwords. Though the number of words involved is not large, it represents roughly 10% of the feminine loanword set. What might motivate this pattern? I reject several explanations below, before concluding that the motivation is a need to maintain consistency in the percentage of feminine nouns in Spanish.

It is not the case that /a/ is the epenthetic vowel and is surfacing here as a phonotactic repair. Recall that the normal epenthetic vowel is not /a/ but /e/

in Spanish. Moreover, not all the exceptional forms are in need of final epenthesis at all. Final /r, n, l/ are all licit in Spanish and attested in the exceptional set. Therefore the insertion of final /a/ cannot be attributed to phonotactics. Moreover, one of the /a/-final forms is not derived by vowel insertion at all, but by final consonant deletion, so that a formerly word-internal /a/-vowel surfaces as word-final (*alharma*).

On the assumption that /a/ is inserted as a signifier of feminine gender, do the exceptional forms display any of the semantic or phonological properties previously hypothesized as associated with grammatical femininity? Referring back to the criteria given in Section 2.1.1, the answer is no. None fall into the very limited set of semantic fields associated with femininity (inherently gendered or alphabetical). In fact several could be called tools, which are biased towards grammatical masculinity (at least if electrical; Pountain 2006). Nor are the phonological criteria helpful. Final /l, n, r/ are all biased towards masculinity, but attested in the Arabic source forms of the exceptional set (*alcaparra*, *aduaná*, *alharma*), as are stressed diphthongs (*azotea*). Nevertheless, in an attempt to rule out entirely the possibility that phonology is somehow driving feminine gender assignment for these cases, an experiment was carried out with native (bilingual) Spanish speakers in which they were asked to produce Spanish versions of the Arabic exceptional loan forms. This experiment and its results are described in Appendix 1. Finally, the Arabic gender of the forms is also highly disparate, so that even if borrowers knew its gender – unlikely, given the apparent ignorance of Arabic implied by article retention in the forms – it does not appear to play a role in gender assignment.

In contradiction to the predictions of a markedness-based account involving a masculine default, then, gender assignment does *not* always result in masculine gender in this set of loanwords. Even a general principle of masculine gender assignment that is overruled in the presence of a strong feminine cue like final /a/ does not suffice to explain these data. If that were so, final /a/ would not be gratuitously inserted, as it seems to be for most of the exceptional class. Nor can a theory based on random assignment fit the facts, as there is a noticeable skew among the results (40% feminine, rather than fully half). Lexicon optimization makes a strong prediction for consistent masculine assignment as well, which likewise fails to account for the observed pattern.

In contrast, a role for probability matching fits the facts. The percentage of feminine forms within the set of /a/-initial borrowed nouns – 40% – closely matches the corresponding percentage of feminine forms within the /a/-initial noun set in general, both in the modern lexicon and at the time of borrowing. This is demonstrated in Table 2, which gives the percentage of /a/-initial feminine

nouns in the Spanish lexicon based on the LexEsp corpus (Sebastian et al. 2000) and for the earliest three centuries available in the Davies online corpus, as well as in the loanword corpus. Importantly, such consistency in lexical percentages would not be maintained, if otherwise unmotivated final /a/ had not been generated for a sizeable number of incoming loanwords.

Table 2. % /a/-initial feminine nominals (and absolute number of feminine forms) in Spanish lexica

| 1200s    | 1300s    | 1400s    | Now       | Loanwords | LWs w/out exceptions |
|----------|----------|----------|-----------|-----------|----------------------|
| 40 (154) | 49 (119) | 46 (198) | 41 (1141) | 40 (175)  | 36 (159)             |

Percentages for the early centuries are consistently in the percentile range of the 40s, though with variation, in keeping with the more limited corpus sources available. The synchronic lexicon is nearly an exact match. If the exceptional loanword forms had *not* been borrowed with final /a/, however – but rather were imported in the phonologically expected way resulting in masculine forms – this would not be the case. Instead, the percentage of feminines in the loanword corpus would drop to 36%, and out of the range of the lexical percentages given for any of the attested time ranges. I claim that the motivation for the exceptional forms observed is precisely to shift these percentages into the range previously existing in the lexicon.

### 2.3 The Portuguese loanword corpus

As a neighboring language of the Iberian Peninsula, Portuguese experienced a similar degree of language contact with Arabic, and in fact the two languages were not clearly differentiated for at least the early centuries of this contact. Portuguese is similar to Spanish in that masculine is the default gender, marked sometimes but not always by final *-o*, and feminine marked with final *-a* (Correa et al. 2004). Therefore, this section considers an analogous set of loanwords in Portuguese, as a potential replication of the Spanish data.

Of the specific exceptions noted for Spanish, 11 of the forms have analogue borrowings in Portuguese, identifiable from the etymological dictionary of da Cunha (1989), and listed in Table 3. Portuguese forms are given in Portuguese orthography.

Gender assignment for these is somewhat different than in Spanish. While the majority are still feminine in the resulting borrowings (8 out of the 11), this

Table 3. Exceptional loanwords with Portuguese analogues

| Spanish   | Arabic                                | Portuguese           | Gloss of Spanish form                |
|-----------|---------------------------------------|----------------------|--------------------------------------|
| azotea    | sut'ayh                               | çoteia               | building covering; human head        |
| atalaya   | f'alaazif<br>(dialectal<br>f'alaayif) | atalaia              | tower or elevated place              |
| arracada  | zaqraat <sup>f</sup>                  | alcarrada, arrecada  | earrings                             |
| almarada  | mixraz                                | almaraz (m)          | iron weapon point or needle          |
| alhóndiga | funduq                                | alfándega            | market, warehouse (modern use=hotel) |
| alforja   | xurj                                  | alforge (m)          | type of carrying bag                 |
| alcarraza | karraaz                               | alcarraza            | cooling container                    |
| alcaparra | kabar                                 | alcaparra            | caper (herb)                         |
| aduana    | diwaan                                | aduana               | customs                              |
| albenda   | band                                  | albende (m)          | patterned white hanging cloth        |
| almartaga | martak                                | almártaga, almártega | meaning unclear                      |

is not true for all. Three of the forms are masculine in Portuguese (annotated in bold above). The differences suggest that, as hypothesized in the preceding section, feminine gender assignment is *not* tied primarily to semantic or phonological properties of the words in the source language. If this were the case, assignment between closely related language varieties should be consistent.

The full set of Portuguese loanwords may also be considered independently of Spanish. It is somewhat smaller than the Spanish one, comprising a total of 297 /a/-initial forms. (Although article allomorphy is not operative in Portuguese in the same way as for Spanish, the loanword corpus remained restricted in this way both for maximum comparability across languages, and because it in any case includes the great majority of Arabic loans, due to incorporation of the article as discussed above).

Once again, a subset of these loans involve insertion of a final /a/ vowel, associated with feminine gender, where phonotactically unexpected. (As with Spanish, a much smaller set of (nine) words involves insertion of masculine -o). These Portuguese forms are given below in Table 4, along with the Arabic source as it is given by da Cunha.

The relative lack of overlap with the Spanish forms given previously provides additional evidence that feminine gender assignment is driven by percentages rather than properties of individual lexical items.

In fact, the percentages, if not the individual items, do match precisely once again. The percentage of feminine forms in the Portuguese loanword corpus, as in

Table 4. Exceptions to Arabic /a/-final feminine loanwords in Portuguese

| Portuguese            | Arabic              | Gloss of Portuguese form |
|-----------------------|---------------------|--------------------------|
| argola                | algull              | ring                     |
| arrecada              | alakraat            | raised                   |
| almóndega             | albunduk            | meatball                 |
| almotolia             | almutlii            | oiler                    |
| almuinha              | almunij             | meaning unclear          |
| almártaga, almártega  | not cited as Arabic | meaning unclear          |
| algerife              | aljerif             | meaning unclear          |
| algibeira             | aldjib              | pocket                   |
| alforra               | alharr              | manumission              |
| alforreca             | alhurreq            | jellyfish                |
| alface                | alkhass             | lettuce                  |
| alcarraza             | alkarraz            | cooling container        |
| alcanzia              | alkanz              | meaning unclear          |
| alcaparra             | alkabar             | caper (herb)             |
| alcachofa, alcachofra | alkarxof            | artichoke                |
| alfándega             | alfunduk            | market, warehouse        |

Spanish, is precisely 40% (n = 118). This proportion would rise slightly with the inclusion of the 4% of the forms (n = 13) which have both feminine and masculine forms. Without the exceptions of Table 4, however, the percentage of feminine forms would drop to even lower than in Spanish, to 34%.

The Portuguese loanwords, then, provide strong support for the probability matching hypothesis, as well as for the relative irrelevance of individual items' forms.

## 2.4 Synchronic test of Spanish nonce words

Informed consent was obtained from 22 speakers (12 females, 10 males) with the same linguistic profile as those of the previous study (Spanish-English bilingual speakers, either balanced or Spanish-dominant, who used and continued to use Spanish at home but enrolled in English-language educational institutions, of the northern Mexico/southwestern US dialect).

Stimuli consisted of 32 disyllabic or trisyllabic, stressed-/a/-initial forms. A complete list is given in Appendix 3. The final segment was either /a/ or /o/ for five forms each, as a quasi-deterministic cue to grammatical gender. The remainder ended in the vowel /e/. Forms with this final vowel are masculine 89% of

the time (Eddington 2004), so the presence of final /e/ induces a bias towards masculine grammatical gender, but not a deterministic one as for final /o/. In addition, two-thirds of the most frequent /e/-final lexical items are feminine (Teschner & Russell 1984), further undermining a tendency toward consistent masculine classification.

Stimuli were presented in written form in random order, using Spanish orthography. Subjects were instructed in Spanish to complete the phrase with the word that seemed best. Two initial examples were given, using real words. The exact wording, along with translation, is given in Appendix 3. The test items were followed by the same post-test of Spanish article allomorphy as in the preceding study.

As before, subjects did not display productive use of article allomorphy as expected. Only 3 of the 22 did so correctly, and none of those did so for both post-test items. More typically, feminine agreement was used consistently regardless of position. This occurred for 18 of the 22 subjects, for well over half the test items overall. Remaining responses varied and showed uncertainty as to the correct form being masculine or feminine.

As expected, gender assignment to the *-a* and *-o* final forms, as indicated by pronominal agreement later in the sentence, was essentially categorical. Each of these stimulus categories was given 95% feminine and masculine assignment, respectively.

As predicted by the probability-matching hypothesis, gender assignment to *e*-final forms was far more variable. Across subjects, the percentage of /e/-final forms assigned feminine gender ranged from 0% to as high as 73%. Thus while some subjects may have been assigning masculine gender either categorically or in accordance with the 89% masculine percentage of /e/-final forms in the lexicon as a whole, this is true only for a minority (7 of 22 subjects – roughly one-third – with the % feminine of /e/-final forms at 10% or less). It is clear that the application of a masculine default is not being used as a strategy by the group as a whole. Nor is an even split between the two gender options. The lexicon optimization hypothesis, unfortunately, cannot be tested with this group. Because the Spanish dialect of this group's speakers apparently does not include productive article allomorphy, the prediction made by LO that masculine should be favored is not relevant for these speakers.

Despite the variation seen among subjects, the overall assignment of feminine gender once again matches that in the lexicon almost precisely when the experimental speech community is considered. The mean percentage of feminine-assigned gender for /e/-final forms overall is 32%. That is, without any otherwise unexpected final /a/ vowels/feminine gender assignment, only 32% of nominals in the experimental stimulus set would be feminine (a greater shortfall

than for the 'unadjusted' loanword corpus, which was 36% feminine without the exceptional final /a/'s). However, with the exceptional /a/-final forms also classed as feminine, the overall percentage feminine rises to 38% – a much closer approximation to the lexical percentage of 41%. While the resulting percentage match is not as exact a match as observed in the corpus studies, the gap between the feminine percentage observed versus the one expected given phonological properties of the stimuli, is actually even greater.

Item analysis reveals that the feminine classification rates of individual /e/-final stimulus tokens varies widely, ranging from 16% to 59%. Most items (14 out of 22, or approximately two-thirds) fall into the 27%–36% range. This suggests once again that inherent properties of the stimulus set (in this case nonce words instead of loan words) do not drive feminine gender assignment. Rather, items are selected as needed on a variable basis, in order to meet probability targets.

The experimental protocol of this study does not allow subjects to implement the rule associating final /a/ with feminine gender, as was done in loanword adaptation. Subjects were not asked to produce the new forms, which would have given them the chance to modify them phonologically (as in Appendix 1). Instead, they provided only gender inflection for previously-determined forms. But even in the absence of such phonological modification, feminine gender was assigned to ambiguous, /e/-final forms in such a way as to bring the lexical statistics of this stimulus set in line with those of the Spanish lexicon as a whole, so that relative proportions of gender are preserved.

## 2.5 Summary

Table 5 summarizes the results of this section, showing the feminine percentages found for /a/-initial forms in the various studies described, and how closely they match that in the lexicon at large.

Table 5. Summary table of % feminine, Iberian Romance gender results

| Synchronic Spanish lexicon | Spanish loanwords | Portuguese loanwords | Nonce words |
|----------------------------|-------------------|----------------------|-------------|
| 41                         | 40                | 40                   | 38          |

It includes data from two different subgroups within the historical Iberian Romance speech community, and a synchronic test as well. Additional comparative and synchronic tests show that this is not attributable to other properties of the lexical forms in question, whether phonological or semantic. Nor can categorical models of morphological representation assignment account for the patterns observed. Neither a consistent default, nor a transparency-favoring approach, nor

a random assignment strategy can fit the facts. Matching pre-existing probabilities is the only remaining plausible motivation for the otherwise unexpected classes of exceptions to otherwise predictable gender assignment.

### 3. Gender assignment to Romance loanwords in Moroccan Arabic

Intense language contact resumed between Arabic and Romance during the colonial period of French North Africa. This section focuses on Romance loanwords into Moroccan Arabic, primarily from French but also in some cases Spanish and Italian, documented by Heath (1989).

#### 3.1 Gender in Romance and Arabic

Like the other languages discussed so far, French has a binary distinction between feminine and masculine gender. However, it lacks the final /a/ cue to femininity consistently seen thus far, and which is also present for Italian.

Arabic gender is embedded in a complex pluralization system that is described in more detail in Section 4. Singulars may be either masculine or feminine in gender, and adjectives (as well as verbs in some word orders) agree with them. (Broken plurals and plurals of feminine singular nouns/adjectives invariably take feminine gender agreement, at least in the standard variety). As stated previously, final /a/ is often associated with feminine gender, and is productively affixed to indicate it in participial morphology (Wright 1996). However, it may also indicate morphological unithood or simply be part of the noun root.

A lexical study of standard Arabic finds that 60% of nominals taking the so-called 'feminine' plural suffix bear a final /a/ in the singular (whereas 20% of those in the diverse class of 'broken' plurals do; Kouloughli 1992). Of Moroccan Arabic specifically, Heath (1989) states only qualitatively that there are 'few' (but high-frequency) exceptions to final /a/ entailing feminine gender. Semantic fields which are associated with feminine grammatical gender in (standard) Arabic, regardless of final phoneme, include those referring to females, placenames, directions, types of wind and fire, and many parts of the body (Wright 1996). Of the nominals (both nouns and adjectives) occurring in Kouloughli's list of the 3000 most common lexical items in a written corpus of newspaper standard Arabic, 31% (n = 395) are feminine in the singular.

#### 3.2 The Moroccan loanword corpus

Heath observes that the Moroccan loans differ from those in Algerian Arabic in that the grammatical gender of the loan does *not* necessarily correspond to that of

the French source form. The only cases acknowledged in the text for which such matching is explicitly observed, are for items with inherent gender. What then, motivates the gender that is actually assigned?

In most cases, Heath demonstrates that regular phonological conversion rules apply. Then, as was the norm for borrowings going in the other direction (from Arabic to Iberian Romance), those forms with a final /a/ are classified as feminine, regardless of the gender of the Romance source form, and others as masculine.

However, Heath notes that in a number of cases, a final /a/ (and therefore feminine gender) is generated unexpectedly, in one of the following ways. First, there may be an unpredictable change in final vowel quality. Example (7a) demonstrates that the French unrounded front mid vowel can be borrowed as a non-low vowel in Moroccan Arabic (MA). However, (7b) is an example of this regular conversion *not* applying, so that an /a/-final feminine form results (forms are given first in French orthography, then in IPA, then the Moroccan Arabic form in IPA).

- (7) Change in final vowel quality
- French *cendrier* [sädrijɛ] → MA [sʰädrijj] 'ashtray'
  - French *cabinet* [kabine] → MA [kabina] 'bathroom'

Similarly, nasalized vowels, especially low ones, can be imported faithfully into Moroccan Arabic, as in (8a). Nevertheless, Example (8b) shows that sometimes they are unfaithfully simplified into oral vowels regardless.

- (8) Simplification of nasalized vowels
- French *accident* [aksidã] → MA [ksidã] 'automobile accident'
  - French *croissant* [krwasã] → MA [krʰwasʰa] 'croissant'

Yet a third strategy resulting in unexpected final /a/ vowels is deletion of a final consonant. Arabic is relatively liberal in terms of permitted coda consonants, and /n/ certainly presents no problem, as example (9a) shows. However, it is sometimes deleted regardless, as in (9b). In conjunction with a change in vowel quality, a final /a/ feminine form results.

- (9) Deletion of final consonant
- French *microphone* [mikrɔ fɔn] → MA [mikrʰufun] 'microphone'
  - French *quinzaine* [kæzen] → MA [kanza] 'fortnight'

Finally, a final /a/ vowel may be epenthesized, even when not phonotactically warranted. Example (10a) shows that a word-final /s/ consonant is permissible, which does not prevent insertion of /a/ in /s/-final (10b).

- (10) Epenthesis of final /a/  
 a. French *brosse* [brɔs] → MCA [brʻusʻ] 'hairbrush'  
 b. French *adresse* [adres] → MCA [adrisa] 'address'

Exploitation of these multiple phonological processes for an apparently singular result (more final /a/ feminine forms) results in the appearance of a *final /a/ conspiracy* in Moroccan Arabic loanword adaptation.

It is clear from the examples given that these feminized forms do not, by and large, fall into the semantic categories biased towards grammatical femininity in (standard) Arabic. Heath presents the initially plausible hypothesis that such unexpected final /a/s are due to speakers' awareness of loan doublets coming in from multiple Romance languages. One example is the MA loanword *bala*, initially based on Spanish *pala* 'shovel.' At a later date, and with growing French/Arabic bilingualism, speakers may have become aware of the French cognate *pelle*. In this pair, and many others, Spanish/Italian final /a/, present in an earlier borrowing, corresponds with Ø in French. As Heath states, bilinguals "appear to have identified the feminine singular suffix /a/ as characteristically added to French nominal borrowings, especially if the noun is grammatically feminine, so that /a/ has been added gratuitously to some more recent French borrowings (including some masculines)" (Heath 1989: 198). Heath also gives an exhaustive list of forms with such 'gratuitous' final /a/s (Heath 1989: 132), observing that the 'majority' (though, as noted, not nearly all) are grammatically feminine in French as well.

An alternative hypothesis is that the schwa produced by French speakers at word-final consonant release (not indicated in the phonemic IPA transcriptions given above) is interpreted by Arabic-speaking listeners as a final /a/-vowel. However, this explanation fails on several counts. First, it does not explain why epenthesis of final /a/ after word-final consonants is inconsistent, even for very similar phonological contexts such as those in (10). Second, it fails entirely to explain the other three phonological strategies exemplified in (7)–(9).

Finally, both it and Heath's hypothesis fail to capture the striking match in relative gender probabilities that the inclusion of these 'gratuitous' exceptions generates. Table 6 repeats the gender probabilities observed in Kouloughli's (1992) study, alongside the percentage of feminine forms in the loanword corpus including the exceptional forms, and without them.

**Table 6.** % feminine nominals (and absolute number of feminine forms) in Arabic lexica

| Arabic   | Loanwords | LWs w/out exceptions |
|----------|-----------|----------------------|
| 31 (395) | 31 (242)  | 19 (149)             |

Just as in the Arabic-to-Iberian loans, and the Spanish nonce words, the exceptional feminine forms (those which are not otherwise predicted to have a final /a/) result in an exact probability match, whereas without them, the percentage of feminine forms generated would fall far short of their probability in the pre-existing lexicon.

### 3.3 Summary

Loanwords going in the opposite direction from those discussed in Section 2 nevertheless replicate the previously observed pattern of undergoing unexpected phonological changes that result in a final /a/ vowel associated with feminine gender. These exceptional forms result in the maintenance of grammatical gender proportions in the borrowing lexicon.

## 4. Pluralization in second-language Arabic

Arabic pluralization is a complex system that presents a challenge to both native and second-language learners. In this section I first describe the system, then discuss an experiment charting its development across four different stages in the second-language acquisition process.

### 4.1 Arabic pluralization

Arabic makes use of as many as 33 pluralization mechanisms. Two 'regular' patterns involve the suffixation of a masculine or feminine plural morpheme to the singular stem (respectively, *-iin* in the modern dialects, and *-aat*), as shown in the following examples:

- (11) Feminine regular plurals
- |    | <i>Singular</i> | <i>Plural</i> | <i>Gloss</i> |
|----|-----------------|---------------|--------------|
| a. | sitt            | sittaaat      | lady         |
| b. | zawḍa           | zawḍaataat    | wife         |
- (12) Masculine regular plurals
- |    |          |             |          |
|----|----------|-------------|----------|
| a. | muhandis | muhandisiin | engineer |
| b. | fallaah  | fallaahiin  | farmer   |

The class taking the masculine regular suffix is semantically coherent, consisting only of human males (though not all forms referring to human males fall into this category). The feminine is often associated with a final /a/ vowel, which is also used productively in other areas of morphology to signify feminine gender. Final /a/

occurs in something over a majority (60%) of *-aat*-taking singular stems found in Kouloughli's (1992) lexical study of standard Arabic. In the second-language lexicon, as exemplified in the textbook glossaries of the subject groups (Thackston 1996; Brustad et al. 1995, 1997), this percentage rises to 75%. However, final /a/ may also indicate morphological unithood or simply be part of the stem. It also occurs in 20% of the singulars taking broken plurals (Kouloughli 1992). The percentage is similar in the lexicons of the experimental subjects at earlier stages of acquisition, as represented by their respective textbook glossaries, these percentages are similar: 15% for Group 1 and 21% for Group 2 and 3.

The feminine plural suffix *-aat* applies to a far greater variety of forms than other plural types both phonologically and semantically, and has been identified as a default on this basis (Boudelaa & Gaskell 2002). In addition, it is reportedly preferred with loanwords and novel forms. For example, virtually all of the loanwords documented by Heath take the feminine plural suffix, regardless of whether they are 'feminine' in the singular). Boudelaa and Gaskell (2002) find that feminine-pluralizing forms also constitute the largest single class of plurals, if the 'broken' class is decomposed into its constituent subpatterns.

These 'broken' plurals involve the internal modification of the singular stem (Wright 1996).

Table 7. Most frequent broken plural patterns

| Singular | Plural   | Gloss     | Template |
|----------|----------|-----------|----------|
| ḡariida  | ḡaraaʒid | newspaper | waraaʒid |
| ḡism     | ʒaḡsaam  | body      | ʒawraad  |
| qalb     | quluub   | heart     | wuruud   |
| raḡjul   | riḡjaal  | man       | wiraad   |
| kitaab   | kutub    | book      | wurud    |

In Standard Arabic, while numbering up to 31 patterns by some counts, the broken plurals fall into 11 major prosodic classes. The top five most frequent – exemplified in Table 7 in order of frequency – account for over 80% of broken plurals (type frequency; Kouloughli 1992).

#### 4.2 Experimental methods and materials

Informed consent was obtained from 43 adult English-speaking subjects, none native speakers of Arabic or any other Semitic language. Subjects fell into four categories, divided according to proficiency level as determined by course membership.

Group 1 (n = 7) had just completed an intensive one-month introductory course in Arabic. The test questionnaire was administered to other groups at a point ¼ of the way through their full-year university courses in Arabic. Group 2 (n = 15) subjects were in a first-year course and Group 3 (n = 16) in a second-year one. Finally, Group 4 subjects (n = 5) were in a fourth-year graduate level course. In addition to their coursework, most Group 4 subjects also had immersion experiences living in Arabic-speaking countries.

Subjects were given a questionnaire containing 42 Arabic singular nouns in Arabic script. Items were based on the list used by Ravid and Farah (1999) in their study of pluralization by native acquisition of Palestinian Arabic by children from two to five years old, for maximum comparability with native learners. In addition, due to being aimed at small children, it contained very high-frequency words, also likely to be known to L2 learners. To ensure familiarity with the items, only those which were also found in the glossary of the students' classroom textbooks were retained (Thackston 1996; Brustad et al. 1995; Brustad et al. 1997). This resulted in the substitution of a couple of forms (though not all) used by Ravid and Farah which are specific to the Palestinian Arabic dialect. The full stimulus list is given in Appendix 4. In addition to the Arabic forms, the English translation of each word was provided alongside each item.

Target plurals were divided evenly between the default feminine suffix (14 items), the masculine suffix (14 items), and broken plurals of several of the most common types (14 items). Of the 14 feminine plural targets, 9 end with final /a/ in the singular form. Three of the broken plural targets end with final /a/ in the singular. These are in line with the percentages existing in the Arabic lexicon in general.

Subjects were instructed to write the corresponding Arabic plural to the side of each item, and to make a guess at the plural even if they were not sure.

#### 4.3 Experimental results and discussion

Remarkably, there was no significant overall effect for proficiency (as indexed by subject group) on accuracy in plural production. Figure 1 displays the mean absolute number of correct plurals produced by each group (out of the total of 42 stimuli).

The values range from a minimum of 56% correct (for Group 3, only slightly exceeded by Groups 1 and 2 at 58% and 57% correct responses, respectively), up to a maximum of 70% correct responses for the highest-proficiency group – even when they are tested on basic words that should have been learned in the first year of study.

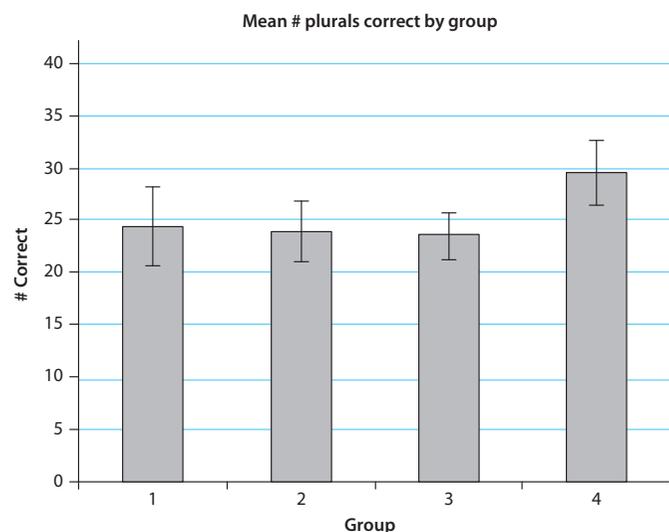


Figure 1. Mean # plurals correct by group

However, it is not the case that nothing has been learned. Figure 2 breaks down the percentages of correctly produced plural forms by stem type as well as by

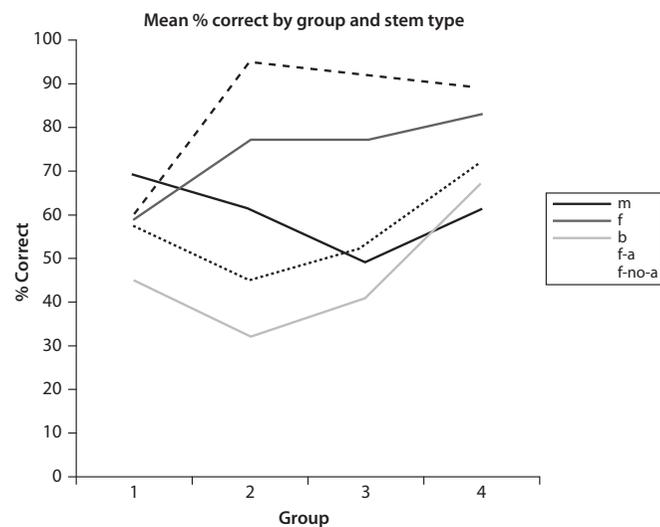


Figure 2. Mean % correct plurals by group and stem type

proficiency group. Masculine, feminine and broken plural categories are indicated, and the feminine category is also further subdivided into those with final /a/ and those without.

This more nuanced look at the correct plurals makes clear that feminine forms have an advantage in production. They are produced more accurately, earlier on, than masculine or broken plurals.

This advantage is driven entirely by the cue of final /a/. By the time students of Arabic reach the second proficiency level, they have correctly identified a final /a/ vowel as a good cue for feminine grammatical gender, and productions of such forms reach ceiling performance level. Those without final /a/, however, remain low in accuracy – in fact declining in accuracy from Group 1 to Group 2, presumably because learners have generalized further that a form that does *not* have final /a/ is *not* feminine.

Interestingly, learners seem to arrive at these generalizations without explicit instruction. The textbooks of Group 2 and 3 learners do not identify final /a/ as a cue in the sections on pluralization. Rather, they advise students that plurals are unpredictable and should be memorized on a case-by-case basis (of course, instructors may have provided additional helpful generalizations of their own).

When learners do make errors, however, what kinds of errors are they making? Because we have seen that feminine forms are by and large produced correctly after the first proficiency level, this category is excluded from Figure 3. Also excluded are error types which occurred only in very small numbers, such as repetition of the singular stem, substitution of another lexical item (usually a mass noun), or multiple pluralizations (such as a broken pattern and suffix to the

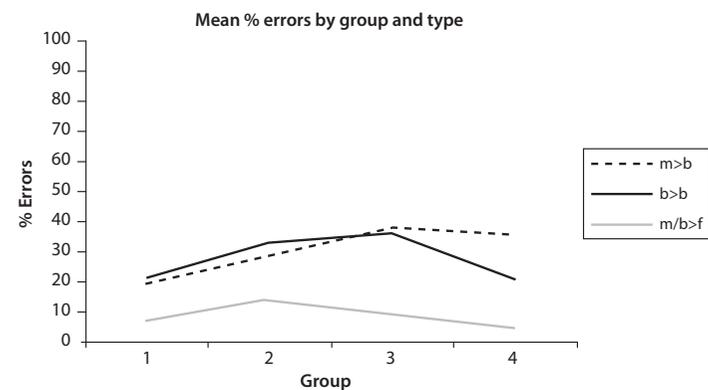


Figure 3. Mean % errors by group and output type

same form). Figure 3 does depict errors in which a broken form is produced for a masculine stem; in which a broken plural is produced for a stem which should take a different broken plural; and in which a masculine stem is produced with a feminine plural suffix.

Near the initial learning state, errors are relatively evenly divided among output types (the number produced erroneously as feminine is comparable here). Subsequently, by far the greatest number of errors are broken plural outputs, whether for forms which should take masculine plural suffixes, or those which are broken but of some other type than the output. A much smaller number of forms take erroneous feminine plurals – primarily those broken forms with final /a/.

The following set of graphs, then, compares the percentage of erroneous broken plural outputs for each proficiency level (with those of the learner lexicons at that level, as determined by the textbook glossaries for the first three groups, and Kouloughli's lexical study for the fourth). Categories include the five most frequent broken plural patterns; the category 'other,' which includes all other patterns, none of which constitute more than 5% in the Arabic lexicon; and, for the learner data, the category 'wrong,' for outputs that involve stem modification but do not conform to any extant grammatical broken plural pattern.

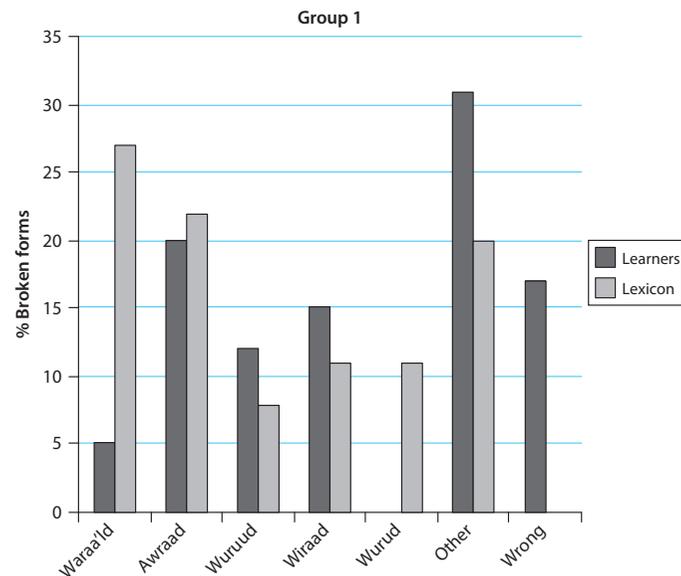


Figure 4. Broken plurals of Group 1 outputs and lexicon

Recall that learners at the lowest level of proficiency are not particularly likely to make errors involving broken plural outputs, compared to other types. Figure 4 shows that when they do make such errors, output percentages are not at all correlated with those of the input. Learners at this level target infrequent as well as frequent forms as likely as not (the largest single output category, comprising roughly one-third of erroneous broken plural outputs).

This picture changes drastically for the Group 2 learners at the next proficiency level. The category 'wrong' (containing impossible broken plural patterns) shoots upwards in relation to Group 1, reaching well over one-third of outputs. This is in strong contrast to the memorized forms produced by the early learners. Group 2 speakers are attempting to productively generate broken plurals, even if they are not yet able to do so accurately.

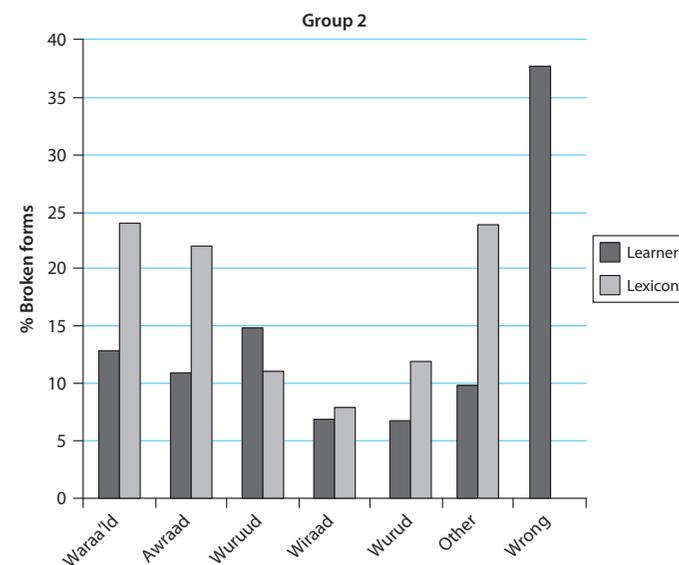


Figure 5. Broken plurals of Group 2 outputs and lexicon

Among the other categories, the distribution has leveled out considerably compared to the highly uneven distributions produced by Group 1. For all categories but 'wrong,' percentages hover at around 10% (the range is from 7% to 15%). This reflects a change in strategy, toward one that is reminiscent of the random distribution hypothesis of representational selection. However, the distribution is

not entirely random, since the percentages of the five most frequent categories are each rather similar to that of the catch-all 'other' category of less frequent ones. This indicates some awareness of which broken plural forms dominate, even if finer-grained information about the relative probabilities of more frequent ones is lacking.

At the more advanced level of Group 3 learners, the percentage of 'wrong' outputs has gone back down to approximately half that of Group 2 (19% versus 38%).

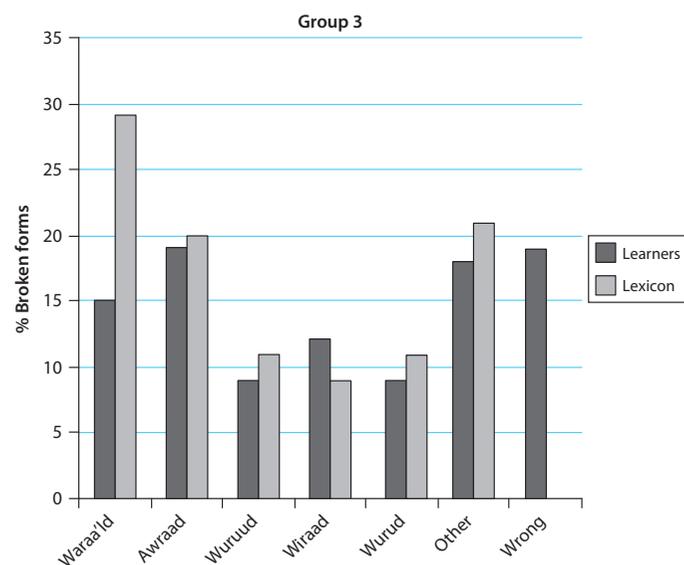


Figure 6. Broken plurals of Group 3 outputs and lexicon

In addition, Group 3 learners show a much closer match between the relative percentages of broken plural types that they produce, and the percentages of each broken plural type in the lexicon they are attempting to acquire. For all but one plural category, Group 3's output percentage is within 3 percentage points of its proportion within the lexicon.

Figure 7, finally, illustrates the state that an advanced learner can be expected to attain.

The percentage of 'wrong' broken outputs is the lowest seen yet, at just 13% (though still non-negligible – recall that these learners still produce only 70% correct responses). The outputs for the most frequent category come in line with

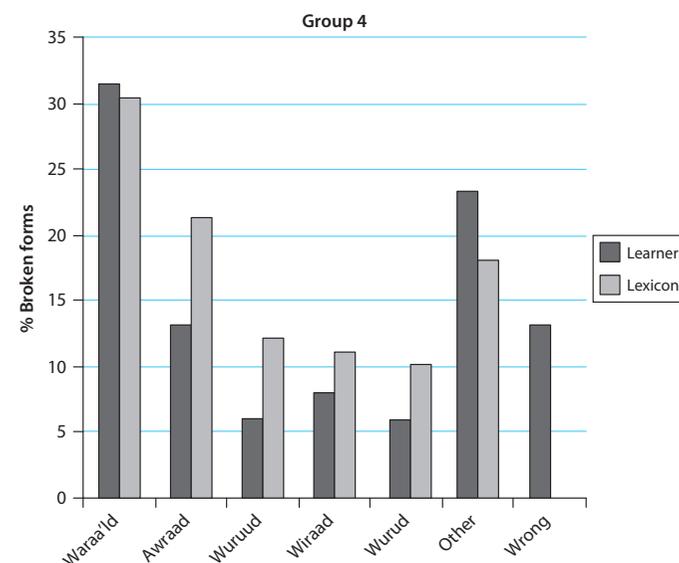


Figure 7. Broken plurals of Group 4 outputs and lexicon

those of the lexicon, in contrast to Group 3 (though the matches for the other categories are not quite as close).

#### 4.3 Summary: Acquisition of Arabic plurals

Performance on L2 Arabic pluralization illustrates the extremely challenging nature of the system. While difficulty is to be expected, the lack of significant improvement across proficiency levels is more surprising. Detailed comparison of correct types and error types reveals a learning trajectory, however. Learners pick up on the association of final /a/ with feminine grammatical gender quite early, and this generalization guides both their domains of accuracy and some kinds of errors that they make. In general, other than forms with a misleading final /a/, the preferred output is a broken plural.

This pattern is also observed for native adult Arabic speakers by Suhaibani (2004), who finds in a study of nonce word pluralization that the majority (63%) of outputs are broken. Interestingly, 31% of outputs were feminine *-aat*-suffixed plurals, showing a precise match of feminines in the lexicon in the same way as the loanword studies above.

This adult behavior differs drastically from that of child L1 Arabic learners (Ravid & Farah 1999). Children also perform better from the first for feminines,

even more so than adults. Their erroneous outputs, however, reflect the use of a single default rather than a distribution in accordance with the lexicon. This default is the feminine suffix, rather than one of the broken patterns probabilistically preferred by adults. The transition toward probabilistic preference for broken plurals, versus a feminine default, occurs between 8 and 10 years of age in Suhaibani's developmental data on real words.

This preference for broken plurals by adult English-speaking learners cannot be explained on the grounds of markedness, as templatic morphology of the type it embodies is quite marked cross-linguistically. Nor can it be due to some kind of interference from the native language, since such morphology is lacking in English. Rather, its very difference from English seems to have made it highly salient to English-speaking learners, and therefore preferentially produced. English speakers overdo it with respect to broken plurals in a manner reminiscent of hypercorrection. But they learn to do so in accordance with Arabic lexical distribution norms. Moreover, this represents a major change from child language acquisition strategies.

### 5. Modelling morphological probability matching

Sections 2–4 document a consistent pattern in which morphological variables remain at stable percentages in the lexicon, regardless of changes in the composition of that lexicon. In this section I outline a potential mechanism generating this pattern. In doing so I follow Rice's (2006) optimality-theoretic model of gender assignment, with the addition of gradient constraint ranking as in Boersma and Hayes (2001). The model is exemplified in the Arabic-to-Spanish loanword direction, but stochastic variation in ranking of gender markedness constraints can as easily generate the pattern going the opposite direction, from Romance to Moroccan Arabic. Given a framework in which Arabic nouns are lexically marked for pluralization pattern (rather than it being determined by the prosody of the singular form), the account could be extended to the data from Section 4 as well.

The Rice model postulates the existence of language-specific gender assignment constraints. When multiple ones exist, these are crucially unranked with respect to each other. For the cases discussed here, only one is operative – a constraint associating final /a/ with feminine gender. The language specific constraint(s) dominate markedness constraints against each gender in the grammar of the language. Constraints used in the tableaux below are listed in (13) (I leave aside the additional constraints involved in selecting an epenthetic vowel, as well as for cases of exceptional final /a/s in which epenthesis is not otherwise necessary).

- (13) Constraints for analysis of Arabic-to-Romance loanwords
- NOCODA: Forms should not surface with consonant(s) in the syllable coda.
  - FEM=/A/: Feminine grammatical gender and final /a/ should be associated.
  - FAITH: Shorthand against epenthesis, vowel quality changes, etc
  - \*FEM: Forms should not surface with feminine grammatical gender.
  - \*MASC: Forms should not surface with masculine grammatical gender.

Figure 8 illustrates the operation of the constraints to a hypothetical consonant-final loanword from Arabic to Spanish. The input is the form heard as an Arabic production by a Spanish borrower, while the output is both the form produced in Spanish and the one subsequently stored as the new Spanish item.

| /atab/        | NoCODA | F=/a/ | FAITH | *F | *M |
|---------------|--------|-------|-------|----|----|
| a. atab-F/M   | *!     |       |       |    |    |
| b. atabe-F    |        | *!    | *     | *  |    |
| c. → atab e-M |        |       | *     |    | *  |
| d. atab a-F   |        |       | *     | *! |    |
| e. atab a-m   |        | *!    | *     |    | *  |

Notice that Candidate (d) will be optimal when \*M outranks \*F.

Figure 8. Typical masculine gender assignment in Arabic-to-Spanish loanwords

Epenthesis is necessary to avoid a phonotactically impermissible /b/ coda. Either the normal epenthetic vowel /e/ or a final /a/ vowel is possible, but final /a/ is ruled out since it would force feminine gender, and the candidate with it would therefore be excluded through a violation of the markedness constraint against feminine gender (ranked higher than the one against masculine gender).

When a final /a/ vowel is present in the input, on the other hand, as shown in Figure 9, the constraint FAITH rules out deletion or a change of vowel quality, and FEM=/A/ forces feminine gender to go along with the surface /a/ vowel.

| /atab a/      | NoCODA | F=/a/ | FAITH | *F | *M |
|---------------|--------|-------|-------|----|----|
| a. atab-F/M   | *!     |       |       |    |    |
| b. atabe-F    |        | *!    | *     | *  |    |
| c. atab e-M   |        |       | *!    |    | *  |
| d. → atab a-F |        |       |       | *  |    |
| e. atab a-M   |        | *!    |       |    | *  |

Figure 9. Typical feminine gender assignment in Arabic-to-Spanish loanwords

How, then, are the exceptional cases generated? To do so necessitates the incorporation of gradient constraint ranking into the model. Boersma and Hayes (2001) posit low initial rankings for language-specific constraints such as the gender principle FEM=/A/. Such constraints then rise in the ranking over the course of the learning process. Eventually they overtake the gender markedness constraints in the ranking (\*FEM and \*MASC). Throughout that time, the relative ranking of the two constraints \*FEM and \*MASC will be determined and continuously calibrated based on the speaker's observation of their respective frequency in the lexicon.

This gradience in their ranking means that for some of the time, their ranking will be reversed from the one shown above, as shown in Figure 10.

| /atab a/      | NoCODA | F=/a/ | FAITH | *M! *F |
|---------------|--------|-------|-------|--------|
| a. atab-F/M   | *!     |       |       |        |
| b. atabe-F    |        | *!    | *     | *      |
| c. atab e-M   |        |       | *     | *!     |
| d. → atab a-F |        |       | *     | *      |
| e. atab a-M   |        | *!    | *     | *      |

When \*F is higher-ranked, (c) will be the winning candidate. This accounts for cases in which a final /e/ triggers masculine gender assignment.

Figure 10. Exceptional feminine gender assignment in Arabic-to-Spanish loanwords

For this minority ranking, the same hypothetical incoming loan as in Figure 8 above – /atab/ – surfaces as one of the exceptional feminines, with a final /a/.

Once a particular output has been generated by a particular speaker, it becomes their input to future productions (in place of the original Arabic form serving as the input in the tableaux above). This results in different evaluations of faithfulness constraints with respect to it. Stabilization of the new lexical item is also enforceable via a USE-LISTED constraint like those of Zuraw (2000). Differences in linguistic input to different individuals would result in different stochastic rankings of the two markedness constraints, so that individual variation in percentage feminine generated would be expected, just as observed in the experimental behavior observed in Section 2.

## 6. Conclusions

The series of studies presented here have illustrated a persistent pattern in which language users and learners match pre-existing percentages of morphological variables in the lexicon. This is true of both grammatical gender and plural/noun classes. It is true of new items in the native lexicon, whether loanwords, nonce

words, or newly acquired words of any kind. It is true of the native lexicon, and of a second-language lexicon, more and more so as that lexicon is better acquired.

However, 'acquisition' here refers not to the individual items of that lexicon necessarily, but to patterns generalized over it. The second-language study reveals that these patterns are abstracted from a lexicon the individual items of which are not necessarily well-learned. Therefore, gender and plural assignment is *not* performed on the basis of analogy to existing forms, since individual forms may not have been learned at all, or could have been learned incorrectly. Nor is it performed by the assignment of a default, markedness-determined or otherwise – in contrast to the overregularization-to-default employed by children – or by random assignment among the possible variables allowed by the language, or in such a way as to necessarily maximize transparency between the output and representation (lexicon optimization).

Matching pre-existing percentages in the lexicon results in stability of representational variables in that lexicon over time, in spite of changes among individual lexical items. Adults appear to learn distributional generalizations, without complete knowledge of lexical items themselves. This knowledge is then exploited in selecting representations, in preference to other mechanisms.

Table 8. Responses to synchronic test of original Spanish items

| Spanish   | Arabic   | Subject 1 | Subject 2 | Subject 3 | Subject 4 | Subject 5 |
|-----------|----------|-----------|-----------|-----------|-----------|-----------|
| almijara  | maʒjal   | medyet    | mejol     | megan     | –         | metjol    |
| acion     | siyuur   | siur      | sillor    | isiur     | –         | aciur     |
| ajaquefa  | shiqaaʃ  | asuclef   | chakef    | ashita    | –         | ashatlef  |
| albenda   | band     | band      | band      | aband     | bend      | band      |
| arracada  | ʒaʒraaʃ  | carrot    | carrat    | carrot    | carrod    | corract   |
| almarada  | mixraz   | marje?    | almijres  | mejras    | merques   | megriss   |
| alhóndiga | funduq   | fondo     | fundoc    | fondo     | fondo     | fondog    |
| alforja   | xurj     | jurism    | joreg     | jorsh     | –         | horitch   |
| alcarraza | karraaz  | carres    | carrez    | carez     | carraz    | carrez    |
| alcaparra | kabar    | cabert    | cabar     | cabba     | cabad     | cabert    |
| aduana    | diwaan   | andiguan  | dijuan    | diwan     | deone     | ediguan   |
| adárgama  | darmak   | delmack   | darmac    | darmark   | dalmarc   | edarmac   |
| almartaga | martak   | martect   | martac    | martack   | martac    | umartc    |
| azotea    | sut'ayh  | asotea    | asuté     | esutea    | asutalla  | asutaih   |
| atafea    | t'afah   | actofa    | tafa      | atapha    | talfa     | abtofa    |
| atalaya   | t'laayis | atalaya   | atalia    | atalia    | atulalla  | atolalla  |
| alharma   | ħarmal   | hardman   | jarmag    | jarmand   | harma     | harman    |

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## Appendix 1

### Synchronic test of original loan items

As a further test of any potential propensity toward feminine grammatical gender among the exceptional Spanish loanword forms, these were presented auditorily to Spanish speakers for gender assignment. Informed consent was obtained in Spanish from six Spanish-English bilingual speakers of the northern Mexico/southwestern US dialect. All speakers were either balanced or Spanish-dominant bilinguals, who had used and continued to use Spanish at home, then enrolled in English-language educational institutions. Some have claimed that this dialect has lost gender agreement with nouns, resulting in variable agreement for the same word within a single speaker (Sanchez 1982) and agreement errors ranging between 10–21%, depending on medium (Hensey 1976). However, the latter still entails at least 80% correct gender agreement, and Garcia (1998) finds even higher rates of correct performance, up to 94%, for agreeing adjectives as well as nouns – in line with native-like performance that includes occasional speech errors. Therefore, this subject pool should provide a reliable guide to the behavior of Spanish speakers in general.

The exceptional forms (n = 17, including the non-a-affixed form *siyuur*) were read aloud twice in careful speech by an Arabic speaker in a quiet room. Standard Arabic pronunciation was used in lieu of North African dialect, but no effect on final vowel presence or absence is phonologically expected due to this difference. Auditory-only presentation ensured that similar perceptual factors would be at work as in the original borrowing context, and that the same visual articulatory cues were present. Subjects instructed to write them down along with a definite article (so as to indicate assigned gender). Data from one subject who failed to do so was discarded. A post-test was given testing the productivity of article allomorphy for these speakers (stimuli given in Appendix 2), and it was found not to be in effect for any of them.

One subject gave feminine definite articles for 6 of the 17 test items (35%). The remaining four subjects did so for only two or three of them (12% and 18% respectively). Two of the items were particularly likely to be assigned feminine gender – those whose Spanish loan forms are *alharma* and *atalaya*. The former was classified as feminine by all five subjects, and the latter by four out of the five. Such classification did not entail insertion of final /a/, which occurred for only one of the *alharma* transcriptions, though for all of the *atalaya* ones. All the forms produced, in the Spanish-like orthography used by the subjects, are listed in Table 8, with those classified as feminine given in bold.

With the small sample size of this list of exceptions, the patterns seen in the larger loanword corpus do not emerge. Final /a/ is not consistently associated with feminine gender, and the percentages classified as feminine do not match those of the lexicon. However, it is sufficient to show that no inherent phonological bias toward femininity governs feminine assignment to this group of items, beyond at most 2 of the 17.

## Appendix 2

### Materials for Spanish article allomorphy post-test

- \_\_\_ águila aquí es débil. \_\_\_ grandes águilas allí son fuertes.  
 \_\_\_ agua aquí es dulce. Pero \_\_\_ agua allí no es \_\_\_ para beber.

Translations:

- (the) eagle here is weak. (the) large eagles over there are strong.  
 (the) water here is sweet. But (the) water over there isn't (good) for drinking.

Subjects were instructed to fill in orthographically the appropriately inflected version of the article into the blanks. (The fourth blank should contain the gender-inflected form of the adjective for 'good'.)

## Appendix 3

### Stimulus list for synchronic test of Spanish nonce forms

| Disyllabic e-final | Trisyllabic e-final | Disyllabic a-final | Disyllabic o-final |
|--------------------|---------------------|--------------------|--------------------|
| anche              | álfiq̄ue            | ampa               | acho               |
| arpe               | árupe               | asca               | apro               |
| anger              | ámpone              | albra              | anso               |
| alme               | ázquete             | arga               | alco               |
| azque              | ámove               | anfa               | afro               |
| anve               | ámbroje             |                    |                    |
| ambe               | árcite              |                    |                    |
| arze               | álcache             |                    |                    |
| aspe               | ántere              |                    |                    |
| alfe               | ánabe               |                    |                    |
| arre               | áculé               |                    |                    |

**Instrucciones:** Completa la frase con la palabra que parece mejor.  
 (Instructions: Complete the phrase with the word that seems best.)

**Ejemplos:** Hay más enchiladas allá. Por favor dame una.  
 Hay más taquitos allá. Por favor dame uno.

**Examples:** There are more enchiladas over there. Please give me (one).  
 (pronoun in blank requires feminine agreement)  
 There are more little tacos over there. Please give me (one).  
 (pronoun in blank requires masculine agreement).

- 1) Hay más ascas allá. Por favor dame \_\_\_\_\_.  
 2) ....

## Appendix 4

## Stimulus list for Arabic L2 pluralization study

Asterisked forms are those not from Standard Arabic

| Stimulus   | Target plural | Gloss      |
|------------|---------------|------------|
| bannaaʔ    | masculine     | builder    |
| bajjaaf    | masculine     | seller     |
| ʔaskarii   | masculine     | soldier    |
| fallaaḥ    | masculine     | farmer     |
| ḥaddaad    | masculine     | ironmonger |
| muʔallim   | masculine     | teacher    |
| muḥaami    | masculine     | lawyer     |
| muḥandis   | masculine     | engineer   |
| mutarḏim   | masculine     | translator |
| ʕaḥaafi    | masculine     | journalist |
| ʕajjaad    | masculine     | hunter     |
| sikritiir  | masculine     | secretary  |
| tʔabbaax   | masculine     | cook       |
| xayyaatʔ   | masculine     | tailor     |
| taʕbiir    | feminine      | expression |
| zawḏʕa     | feminine      | wife       |
| ʔakl       | feminine      | food       |
| bantʔaluun | feminine      | pants      |
| baqara     | feminine      | cow        |
| ḥikaaya    | feminine      | story      |
| ḏjaamiʕa   | feminine      | university |
| luya       | feminine      | language   |
| marra      | feminine      | time       |
| saaʕa      | feminine      | hour       |
| sayyaara   | feminine      | car        |
| *sitt      | feminine      | lady       |
| tʔaawila   | feminine      | table      |
| *talafuun  | feminine      | telephone  |
| baab       | ʔabwaab       | door       |
| *bissii    | bissaat       | cat        |

(Continued)

Asterisked forms are those not from Standard Arabic (Continued)

| Stimulus | Target plural | Gloss  |
|----------|---------------|--------|
| ʕaʕʔuur  | ʕaʕʔaafir     | bird   |
| dubb     | dibaab        | bear   |
| ḥisaan   | *ḥsuuni       | horse  |
| ḏʕamal   | ḏʕimaal       | camel  |
| ḏʕawḥar  | ḏʕawaahir     | jewel  |
| kalb     | kilaab        | dog    |
| mawza    | mawz          | banana |
| ʕubbaak  | ʕabaabiik     | window |
| tʔabl    | *tʔbuuli      | drum   |
| tuffaaḥa | tuffaaḥ       | apple  |
| walad    | ʔawlaad       | boy    |
| waḏʔiifa | waḏʔaaʔif     | job    |

# Gender differences in VOT production of Arabic/English bilingual children

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This study examines Voice Onset Time (VOT) in six (three boys and three girls) pre-adolescent Arabic/English bilinguals. Both English and Arabic have a two-way voicing distinction: English contrasts short and long lag VOT while Arabic contrasts lead and short lag VOT. Due to exposure to languages with voicing contrasts, these children are expected to acquire two phonetic/phonological systems. Results indicate that the girls have higher VOT values for voiceless stops than boys. However, they have lower values for voiced stops. In addition, VOT mean values of Arabic and English for both groups were close to values produced by monolingual speakers. These findings show that children exhibit gender-linked differences in VOT patterns. These distribution patterns are primarily attributed to physiological factors such as the size and structure of the vocal tract for both sexes. It is also shown that bilingual children maintain two different phonetic/phonological systems for their languages.

**Key words:** VOT; gender; bilingual; Arabic/English

## 1. Introduction

Previous research shows that bilingual children are able to make language-specific category distinctions for their languages (Tsukada et al. 2004). Many studies examine the stop voicing contrast as reflected in VOT (Voice Onset Time), considering it a salient parameter in measuring bilinguals' production/perception of their phonetic systems across varying ages (Holm & Dodd 1999; Heselwood & McChrystal 1999; Kehoe et al. 2004). VOT is defined by Cho & Ladefoged (1999: 225) as "the time between the initiation of the articulatory gesture responsible for the release of a closure and the initiation of the laryngeal gesture responsible for the vocal fold vibration." Because VOT may vary across languages, it has been used by many researchers as evidence of how bilinguals adapt their fine-grained language-specific temporal patterns to one code or another.

While both English and Arabic have a two-way contrast between voiced and voiceless plosives, they implement this contrast differently: English voiced vs. voiceless plosives are distinguished by a short vs. long lag VOT while Arabic plosives are distinguished by lead (prevoicing) vs. short lag VOT. Previous work has established that English VOT patterns fall within a range that differs from those for Arabic, and that Arabic/English bilingual children develop VOT patterns that are relatively consistent, with varying degrees of overlap, with the VOT patterns of monolingual Arabic and English speaking children (Khattab 2000). However, no previous research has addressed the role of gender differences in the VOT patterns of Arabic/English bilinguals.

The present study addresses the question of whether seven to ten year-old Arabic/English bilingual children acquire native-like VOT values in each of their languages, and specifically whether their VOTs reflect the gender differences that have been shown for monolingual children and adults. The goal of this study is to examine the effects of age and gender on VOT patterns in a fixed phonetic context for Arabic/English bilingual children. The paper reports on two experiments designed to investigate the VOT values of Arabic/English preadolescent bilingual children and of Arabic/English bilingual adults. The experimental results indicate that the bilingual children have acquired English VOT values that are similar to those of monolingual English-speaking children. Moreover, the girls' VOT ranges for English voiceless stops values are longer than those of the boys, a pattern that is consistent with the VOT values of monolingual English-speaking females (Whiteside et al. 2004).

## 2. Background

Since Lisker and Abramson's seminal paper (1964) on VOT as a cue to voicing contrasts, many studies have looked at VOT across languages, phonological contexts, and speech style, and many previous studies have focused on testing VOT values in the speech of bilingual adults (Hazan & Boulakia 1993; Sundara et al. 2006) and children (Watson 1990 & 1991; Deuchar & Clark 1996; and Khattab 2000). Developmental changes in VOT values and the acquisition of voicing control differ with respect to age and gender for monolingual as well as bilingual adults and children (Whiteside & Marshall 2000; Zlatin & Koenigsnecht 1976; Ryalls et al. 1997; Gerosa et al. 2006; Tsukada 2004; Macleod & Stoel-Gammon 2005; Stölen 2006). Below I review findings with respect to the acquisition of voicing control in monolinguals and bilinguals, as well as the relationship between gender and VOT.

### 2.1 Acquisition of voicing control

From infancy to adolescence children's VOTs go through several stages of development. In infancy, children produce voiced and voiceless stops with similar values as reported by Macken and Barton (1980) in their study on American English. Later on, they differentiate voiced and voiceless VOTs, and display VOT ranges that vary from being larger than adult ranges (Zlatin & Koenigsnecht 1976) to being comparable to adult ranges by age eleven (Tingley & Allen 1975). Before puberty, American English speaking children are reported having a higher VOT values for voiceless stops than adults (Gerosa et al. 2006; Koenig 2001, and Zlatin 1972). Upon reaching puberty, monolingual children have been shown to develop adult-like VOT values in American English (Koenig 2000). Interestingly, Ryalls et al. (1997) also found variation in VOT measures among adults as a function of age, in the French of 24-year-old vs. 67-year-old speakers. These results contrast with Sweeting and Baken's (1982) findings for American English, reporting no significant interaction between age and VOT values.

Several studies have investigated bilingual children's VOT production, focusing on languages which possess quite different VOT systems, i.e. voicing lead and short-lag VOT vs. short-lag and long-lag VOT (e.g., Arabic-English (Khattab 2000); Spanish-English (Deuchar & Clark 1996); and French-English (Caramazza et al. 1973 and Hazan & Boulakia 1993). Though bilingual children produce VOTs that are close to the values of monolingual speakers of each language, their acquisition is affected by several factors such as the time the child is exposed to the language, age, and country of residence (Khattab 2000 and Kang & Guion 2006). Flege (1991a) compared English /p t k/ VOT values of L1 Spanish-L2 English speakers who learned English as adults with those who learned it as children. The VOTs of later learners of English were found to be nontarget-like whereas early learners' values matched those of monolingual English speakers. Along the same lines, Flege, Munro, and Mackay (1995b) investigated VOT values of native Italian subjects who arrived in the English speaking community prior to age 11 with those who arrived after 21 years. Earlier learners were found to produce VOTs that more closely matched English. This confirms that the age of L2 acquisition is considered a critical factor in attaining native-like values of the segmental aspects of speech production.

### 2.2 Gender effects on VOT values in adults and children

Physiological differences between men and women are among the most prominent factors affecting VOT values. The greater lengthening of boys' vocal folds around puberty contributes to longer VOTs for voiced stops for males than for females

(Goldstein 1980). In addition, because men have larger vocal fold mass they are less likely than women to have 'chink,' a posterior glottal gap, during voicing (Titze 1989). Additional factors contributing to gender differences involve laryngeal-supralaryngeal timing, the extent of the glottal adduction/abduction, and pressure levels below, within, and above the glottis (Holmberg et al. 1988; Koenig 2000).

Experiments that target gender effects on VOT patterns have focused on adult speakers of American English (Swartz 1992 & Ryalls et al. 1997), British English (Whiteside & Irving 1998), Dutch (Van Alphen & Smits 2004), and Arjeplog, a dialect community in Swedish Lappland (Stölen & Engstrand 2002). Whereas most studies report that women have longer VOTs than men for voiceless stops (Whiteside & Irving 1998 and Ryalls et al. 1997), others find that men have longer VOTs for voiced stops (Smith 1978; Van Alphen & Smits 2004; Thornburgh & Ryalls 1998). In general, it has been found that men's and women's VOT values are different.

Khattab et al. (2006) investigated gender differences in adult Jordanian Arabic production data, comparing the plain coronal plosive /t/ and its emphatic counterpart /tʕ/. In this variety of Arabic, the plain-emphatic contrast was signaled by differences in VOT alongside differences in formant values of adjacent vowels. Highly significant differences between male and female VOTs were found, with women having higher values than men. Furthermore, Khattab et al. reported that male-female differences can not be merely attributed to physiological factors. Interestingly, Rifaat (2003) found that VOT values of plain-emphatic Egyptian Arabic stops were not distinct for males vs. females. Therefore, a diverging male and female speech pattern is a function of sociophonetic rather than purely physiological features.

Most previous studies investigating gender effects on children's VOT values have done so as part of investigating adults' speech development (Koenig 2000; Karlsson et al. 2004) or only among English-speaking monolingual children (Whiteside & Marshall 2000; Whiteside & Marshall 2001; Whiteside et al. 2004). These studies revealed differences in the VOT production patterns of pre-adolescent boys and girls. Whiteside and Marshall (2001) found that girls have longer VOT ranges than boys for their bilabial and alveolar stops at age eleven, although prior to age eleven, VOT alveolar stops patterns of boys and girls were more or less similar. Karlsson et al. (2004) also found that pre-adolescent girls have longer VOT values for their aspirated stops than boys.

In one of the few studies of bilingual children, Heselwood & McChrystal (2000) found that gender did not affect VOT values of English stops in the production of ten-year old Panjabi-English bilingual males and females, though in general, the males' English was more influenced by Panjabi accent than that of the females. The researchers tentatively concluded that gender differences did

not appear to be a decisive factor in the voicing of voiced English and Panjabi stops.

### 2.3 Current study

Children's VOTs go through a developmental pattern that changes according to age and gender. Once puberty is reached, VOT values become generally stable with specific ranges that vary according to voicing, place of articulation of the stop, and vowel context. However, VOT gender-linked differences remain an important distinguishing feature between the speech of males and females. In the following section, I report on two experiments designed to investigate the effect of gender on VOT values in bilingual speakers' production of Arabic and English. This research will help determine at what age bilingual children acquire the distinct VOT values for their two languages.

## 3. Experiment 1

The purpose of this experiment is to investigate VOT values for children and to report how these values may vary among boys and girls. As previously shown, monolingual English-speaking females (adults and children) have longer VOTs for voiceless stops than males. Moreover, it is reported that males have longer VOT values for voiced stops than females. Therefore, if the bilingual children mirror the gender differences of monolingual English speakers, we would expect bilingual girls' VOTs for voiceless stops to be longer than boys. Furthermore, we would expect boys to have longer VOTs for voiced stops than females.

As stated above, the Arabic and English stop systems are different. Both languages have different sets of stops: /p b t d k g/ vs. /b t d k/ for English and Arabic respectively. Although the Arabic spoken by our participants lacks the voiceless bilabial stop /p/ and the voiced velar stop /g/, Arabic and English have a similar opposition of /t/ vs. /d/. It is worth mentioning that /t/ and /d/ are dental in Arabic and alveolar in English, so this difference in the place of articulation of the stops might be expected to influence VOT values. However, Cho and Ladefoged (1999), comparing VOT values in relation to place of articulation in 18 languages, show that dental-alveolar stop differences do not yield significant differences in VOT values, mainly because of comparable air volume behind both constrictions.

More importantly, English and Arabic have different ways of realizing the voicing contrast. English voiceless stops occur with long lag values between 63.0–96.3 ms for seven-year old boys and 84.2–96.0 ms for girls (Whiteside & Marshall 2001). Conversely, Arabic voiceless stops have short lag with values between 7–21 ms for

the seven-year old boy reported in Khattab (2000). In addition, voiced stops occur with lead voicing and short lag for Arabic and English respectively. For a seven-year old, Arabic VOTs are reported to be between 17–32 (Khattab 2000) whereas English values are 10.9–27.5 ms for boys and 13.8–28.6 ms for girls as reported in Whiteside and Marshall's study. These numbers show overlap between Arabic voiceless stops and English voiced stop values whereas Arabic voiced stops and English voiceless stops fall at opposing ends of the VOT continuum.

### 3.1 Method

#### 3.1.1 Subjects

Speech samples were collected from six seven-year old subjects,<sup>1</sup> with three males (mean age 6; 8) and three females (mean age 7; 3). The subjects were selected from the local community in Champaign and in the south suburbs of Chicago. All the subjects are bilingual children who (i) were born to Arabic-speaking parents in the US or came as infants under the age of one, (ii) had their pre- and grade education in English-speaking public schools, (iii) all are speakers of Palestinian Arabic, (iv) are growing up in families where the first language is Arabic, (v) attend weekend school in which they are exposed to limited instruction in Arabic, (vi) have no reported speech or hearing deficits.

#### 3.1.2 Speech stimuli

The children as well as the adults had no prior knowledge of the specific aim of the study. Subjects were engaged in activities to elicit speech production of the stop consonants /t k b d/ in a prevocalic word initial context; /p/ and /g/ were also elicited for the English tokens. Since vowel height affects VOT value, the vowel context following the stop was controlled for and only vowels existing in both languages were elicited. In a balanced set of tokens, the Arabic and English stops were followed by the focal Arabic and English vowels.<sup>2</sup>

The subjects were asked to look at several pictures that had the target words. Each picture represents one of the target words. The words were simple and familiar to the subjects. All subjects saw the pictures by looking at the researcher's laptop and as they provided the stimulus for each target word, the researcher scrolled down the screen to the next picture. The target words consisted of 60 English monosyllabic words in which the stop consonant occurred word-initially. For

1. The children in this study are not related to the adults in the second experiment.
2. The Arabic and English vowels differ phonetically. Arabic contrasts long and short vowels whereas English contrast tense and lax vowels.

Arabic, the stimuli consisted of 40 words only because /p/ and /g/ are not part of the sound inventory of the variety of Arabic of the tested subjects.

Recording took place in the home of either the subject or the researcher. When the tested subject was a child, his/her mother was present during data recording. The participants were recorded individually in a quiet room and recording started by asking them to name objects in pictures. The pictures that represent English tokens were displayed first and were followed by the ones that represent Arabic. The subjects were asked to say each word within a carrier phrase in each language that was "I see a picture of X" where "X" represents a target word. The Arabic version of this phrase was used with Arabic target words. A total number of 100 tokens were elicited from each subject and the total number of tokens for the six subjects combined was 600 words.

### 3.2 Data analysis

Participants' speech production was recorded on a portable solid state recorder at 48 kHz using a Marantz PMD660 recorder. To ensure a better quality of audio recording, a unidirectional professional microphone was also used in conjunction with the recorder (Shure head-worn dynamic microphone). The recordings were analyzed using PRAAT 4.5.16 software (Boersma & Weenink 2007). Each token was analyzed by measuring the VOT value from its corresponding spectrogram. The long sound files were segmented into short ones, each short sound file represents the sentence that contains the token under study. R statistical software application was used to perform all the plots and statistical formulas required to analyze the VOT data.

Since we are dealing with languages that exhibit two different voicing systems, our VOT values are expected to have negative and positive values. VOT measurement was identified from spectrograms from the release of the burst to the onset of vocal fold vibration. The voiceless stop VOT value was measured from the release of the burst to the onset of periodic phonation. In this case, it was a positive value. For voiced tokens, VOT was measured from the onset of voicing to the burst and therefore it was a negative value. VOT is measured in milliseconds. This process was determined visually as well as auditorily by the researcher.

### 3.3 Results

The mean, minimum, maximum, and standard deviation of VOT values for each stop consonant /p, t, k, b, d, g/ were calculated and tabulated for each subject. The analysis will focus mainly on group results. Table (1) shows the results for English words produced by the bilingual seven-year old boys and girls while table (2) shows the same for Arabic words.

**Table 1.** Detailed measurements for VOT means, minimum, maximum, and standard deviations in English for the seven-year-old boys and girls

| Stop | English/Male |       |        |        |       | English/Female |        |        |        |       |
|------|--------------|-------|--------|--------|-------|----------------|--------|--------|--------|-------|
|      | N            | Mean  | Min    | Max    | SD    | N              | Mean   | Min    | Max    | SD    |
| P    | 41           | 71.95 | 14.33  | 191.95 | 33.73 | 42             | 91.33  | 11.86  | 208.92 | 43.83 |
| T    | 30           | 91.81 | 30.22  | 181.13 | 33.82 | 29             | 100.10 | 41.52  | 166.57 | 35.99 |
| K    | 39           | 98.45 | 47.16  | 192.90 | 32.11 | 44             | 121.31 | 47.23  | 263.09 | 40.76 |
| B    | 44           | 5.42  | -115.3 | 28.92  | 22.01 | 42             | 2.98   | -158.4 | 46.31  | 35.40 |
| D    | 39           | 28.92 | -60.23 | 64.68  | 21.01 | 41             | 6.23   | -133.6 | 63.49  | 50.43 |
| G    | 33           | 36.59 | 0      | 104.73 | 20.51 | 32             | 22.14  | -89.46 | 63.97  | 31.47 |

The boys and girls produced English voiceless stops with VOT values that follow the pattern of monolingual English-speaking children (Karlsson et al. 2004; Whiteside et al. 2004). Whiteside et al. report that the mean VOTs for the investigated English-speaking subjects have short lag for voiced stops ( $b = 18$  ms,  $d = 25$  ms,  $g = 38$  ms) and long lag for voiceless stops ( $p = 60$  ms,  $t = 81$  ms,  $k = 82$  ms). Along the same lines, the English voiceless stops' VOT values for the boys occur with long lag while the voiced ones occur with short lag.

VOT values for each stop consonant vary by place of articulation. /k/ occurs with the longest lag among the voiceless stops followed by the alveolar /t/ and finally the bilabial /p/. The voiced stops have short lag values with some tokens in the lead voicing range. As for the female subjects, the VOT values for the English voiceless stops occur with long lag while the voiced ones with short lag. Like males, some females' English voiced stop tokens have negative VOT values. Table (1) shows that the girls' voiceless stops occur with higher lag values than boys. The case is reversed for the voiced stops; females have VOT values with lower short lag means than males.

The VOT results of this experiment conform to the pattern of Arabic stops. Khattab (2000) shows that monolingual Arabic-speaking children produced their voiced stops with voicing lead and voiceless stops with short lag. In the present study, the Arabic voiceless stops occur with short lag values while the voiced ones have lead voicing values. For Arabic, the boys' voiceless stops occur with lower lag values than those of the girls. Like English, Arabic velar /k/ has higher mean VOT values than the alveolar /t/ for both sexes. There is a consistent pattern in which the girls' voiceless stops in both languages have higher mean VOTs than the boys' voiceless stops. For voiced Arabic stops, there is variation between the sexes. Whereas boys have longer lead voicing values for the bilabial /b/ than girls, the alveolar /d/'s mean VOT values for girls have lead voicing while the boys' have short lag. In general, we see that the girls have acquired the voicing lead for the

voiced Arabic stops while boys have acquired only voicing lead for /b/ but not for /d/. Though the results show that the overall mean values for the boys' Arabic /d/ have short lag, some tokens actually occur with lead voicing.

**Table 2.** Detailed measurements for VOT means, minimum, maximum, and standard deviations in Arabic for the seven-year-old boys and girls

| Stop | Arabic/Male |        |        |        |       | Arabic/Female |        |        |        |       |
|------|-------------|--------|--------|--------|-------|---------------|--------|--------|--------|-------|
|      | N           | Mean   | Min    | Max    | SD    | N             | Mean   | Min    | Max    | SD    |
| P    | -           | -      | -      | -      | -     | -             | -      | -      | -      | -     |
| T    | 25          | 41.64  | 20.60  | 105.34 | 22.96 | 26            | 61.56  | 11.50  | 283.51 | 57.06 |
| K    | 33          | 40.70  | 13.24  | 79.60  | 14.87 | 32            | 78.97  | 16.73  | 193.13 | 45.29 |
| B    | 31          | -26.54 | -147.4 | 48.77  | 59.79 | 30            | -16.56 | -129.6 | 97.46  | 53.06 |
| D    | 29          | 20.25  | -104.1 | 73.91  | 34.92 | 33            | -18.03 | -171.3 | 49.79  | 71.50 |
| G    | -           | -      | -      | -      | -     | -             | -      | -      | -      | -     |

The mean VOT values for English and Arabic productions show that these bilingual children have acquired VOT values that are comparable to monolingual children in each language. The voiceless English VOTs have longer lag than those of monolingual English-speaking adults. This resembles the pattern of English-speaking children who have longer VOT values than adults. Gerosa et al. (2006) report higher mean VOTs for children compared to adults. The reported values were 80 and 90 ms for adults' /p/ and /t/ respectively compared with 90 and 105 ms for seven-year old children producing the same phones. Like English monolingual children in Whiteside et al.'s (2004) study, this experiment finds that bilingual girls show the same pattern of longer VOT values than boys. However, the case is a little different for Arabic in which only boys' alveolar /d/ is produced with short lag instead of lead voicing, violating the expected pattern for this particular stop along the VOT continuum.

The boxplots in figures (1) and (2) show VOT ranges for English and Arabic productions, respectively, for boys and girls. In English, girls' voiceless stop values have wider ranges than boys. The voiced stops, however, vary according to place of articulation; whereas boys' alveolar and velar stops have narrower ranges than girls, bilabial /b/ is narrower for girls. The girls' Arabic voiceless stops exhibit the same pattern as the English ones with wider ranges than those of boys. The voiced stops have varying patterns in which girls have wider ranges for the alveolar stop and smaller ranges for the bilabial stop than those of boys.

The data were analyzed with a three-factor Analysis of Variance (ANOVA) for three different cases. In the first case, the three factors are gender, voicing (for Arabic and English productions), and stop (place of articulation). ANOVA

indicated that the main effect of gender ( $F(1) = 6.4085, p < 0.05$ ) was significant, and it was highly significant for both the voicing ( $F(2) = 41.3277, p < 0.001$ ) and stop factors ( $F(5) = 187.7654, p < 0.001$ ). In the second case, the three factors are language, voicing (for both boys and girls), and stop (place of articulation). ANOVA indicated that the effect of each factor, language ( $F(1) = 91.024, p < 0.001$ ), stop ( $F(5) = 189.532, p < 0.001$ ), and voicing ( $F(2) = 13.708, p < 0.001$ ) was highly significant. In the last case, the three factors are gender, language and voicing. ANOVA indicated that the main effect of gender ( $F(1) = 6.197, p < 0.05$ ) was significant, and it was highly significant for both language ( $F(1) = 86.446, p < 0.001$ ) and voicing ( $F(1) = 858.194, p < 0.001$ ).

Since the summary of the ANOVA showed that all previous factors have significant effect on VOT values, post-hoc t-test was also performed. T-test was performed to show if each stop differed between boys and girls. The results show that VOT values were highly significant between the boys and girls for the /p/ ( $t = 2.26, p < 0.05$ ), /k/ ( $t = 2.84, p < 0.01$ ), /d/ ( $t = 2.64, p < 0.05$ ), /g/ ( $t = 2.19, p < 0.05$ ) for English, and /k/ ( $t = 4.55, p < 0.001$ ), and /d/ ( $t = 2.73, p < 0.01$ ) for Arabic.

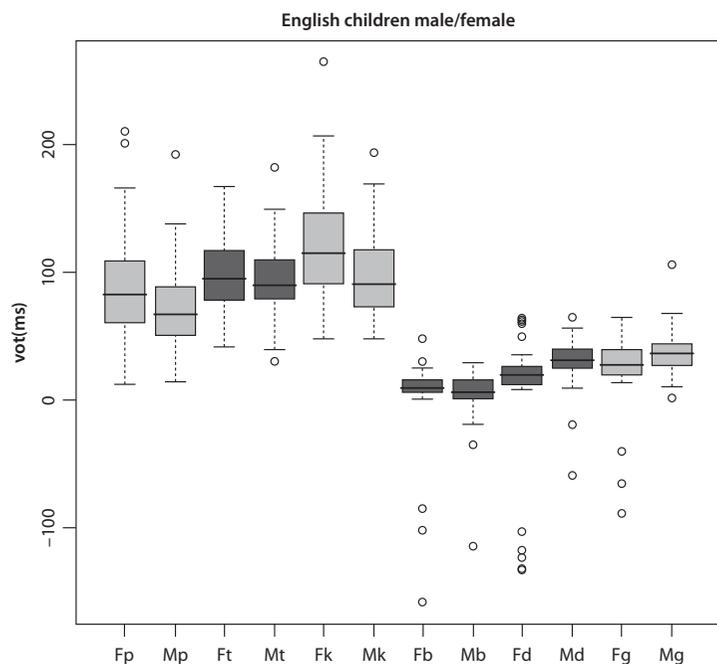


Figure 1. Boxplots for English VOT ranges for the seven-year-old girls and boys

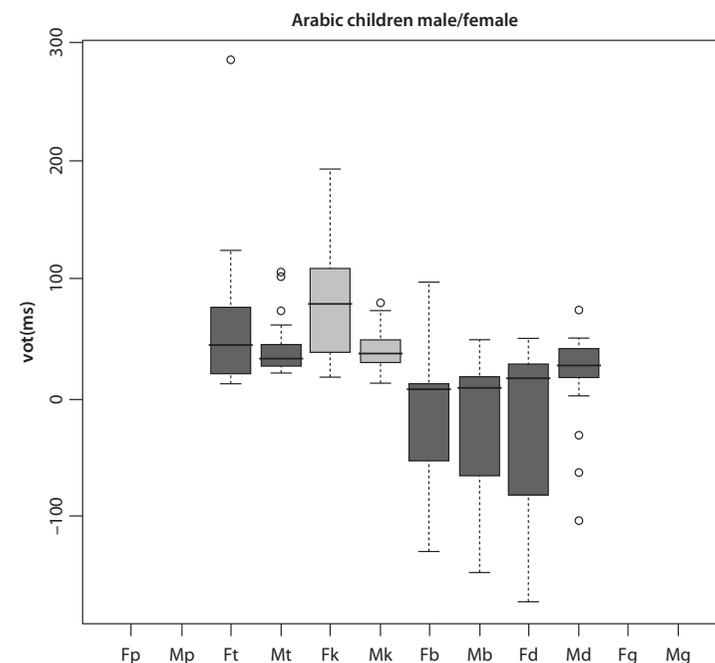


Figure 2. Boxplots for Arabic VOT ranges for the seven-year-old girls and boys

### 3.4 Discussion

This study revealed significant group effects for gender, language, and stop. The VOT patterns reported here for the monolingual/bilingual distinction were as expected with bilingual children producing VOT values similar to monolingual speaking children. In addition, the boy/girl distinction was also confirmed with girls' producing longer VOTs for voiceless stops than boys. Stop VOTs were also consistent with the expected values and showed gradual increase as the place of articulation moved further back in the mouth.

As reported above, the results in Table (1) show that the seven-year-old bilingual boys' and girls' English voiceless stops have long lag values like monolinguals. At this age, children have a tendency to overshoot their voiceless stop values and produce VOT with ranges higher than adults.

In addition, the bilingual girls' English voiced stops VOTs are lower than boys. However, the girls' results show more variation than boys with some values occur with lead voicing. This is a sign of transfer from Arabic to English since only the

former system exhibits VOT values for voiced stops in the negative ranges. Not only this, but it is known that it takes more time for children to produce stops with lead voicing values than to produce short/long lag stop values. More importantly, as predicted by phonetic theory, the distance (or stop's place of articulation) from the glottis affects voicing lead, for example, /d/ is closer to the glottis than /b/. Therefore, it is harder to sustain voicing in a shorter vocal tract, as in /d/, than in a longer vocal tract, as in /b/. Along the same lines, Allen (1985) reports on several strategies that are employed by children to overcome the difficulty of producing voiced stops with voicing lead. Allen finds that French-speaking children produce word initial voiced stops preceded by other segments (mostly nasals); hence, making the VOTs in these tokens immeasurable. Allen argues that speakers tend to prenasalize stops in order to meet the supraglottal pressure for the vocal fold vibrations. Moreover, the nasal segment is voiced preceding the voiced stop to aid in the production of voicing lead. These findings show that producing adult-like lead voicing requires command and control of the articulators and thus considered a demanding motoric skill.

It is not surprising that these bilingual children produced English voiced stops with negative values because they were exposed to Arabic from infancy. On the other side, they are not expected to have acquired lead voicing for all Arabic voiced tokens, at age seven, because children who deal with languages that exhibit voicing lead don't acquire the target patterns of adult speakers until around puberty (Khatab 2000; Whiteside & Marshall 2000, & Kehoe et al. 2004). This is attributed to the difficulty in acquiring voicing lead compared with lag voicing. The English voiced tokens produced by the girls for different places of articulation have higher negative values than boys. It is known that L1 and L2 influence one another and in this particular case we see that the girls produced mixed values from both languages. It is premature to hypothesize that bilingual girls, at least as shown in this study, show more tendency to transfer fine grained phonetic features from one language to another since the same phenomenon is present in the speech of boys but with different ranges. Comparing these results with the English monolingual child in Khatab's study (2000) show that the voiced stops' VOTs are produced with short lag as expected from monolingual children. Overall, the children's VOT values for English voiced stops in this study are closer to monolinguals' than the ones in the aforementioned study.

Overall, boys' and girls' Arabic VOT values have the expected short lag/lead voicing pattern for Arabic voiceless/voiced stops. Even for Arabic, the girls' voiceless values are higher than boys. Not only this, but also with more variation between the ranges. This suggests that the physiological reasons described above for English, such as the size of the vocal tract are behind this phenomenon. The

present results resemble the ones expected from monolingual Arabic-speaking children. For the voiced Arabic stops, the data shows that the girls have acquired the expected lead voicing pattern while boys are still developing it; particularly for /d/. It is known that acquiring lead voicing is more difficult and takes more time than acquiring lag values.

At this stage, I can only hypothesize that the girls might have been using more Arabic in their speech than boys which helped them acquire lead voicing faster and better. The mean VOT values for boys' /d/ occur with short lag and that can be attributed to being closer to the glottis and therefore voicing will be harder to sustain than, for example, /b/. It is a sign of transfer of English voicing feature of this particular stop from one system to another. Prior work has shown that bilingual children have difficulty acquiring voicing lead in languages that exhibit voicing contrast (e.g. Heselwood & McChrystal 1999 for Punjabi). However, gender influence in acquiring this contrast has not been addressed sufficiently thus far. Further studies should be conducted to account for the present findings and until this happens it will be too early to make any generalizations.

#### 4. Experiment 2

The aim of this experiment is to investigate gender differences in the production of VOT for adult male and female Arabic speakers. Since it was not feasible to obtain data from monolingual Arabic-speaking children in order to compare it to the bilingual results in experiment 1, this adult experiment was designed instead. Hence, the children's VOTs are compared to Arabic target values as produced by the adult speakers.

##### 4.1 Method

###### 4.1.1 Subjects

The control group consists of four adults; two males (mean age 32; 0) and two females (mean age 26; 6). The subjects are Arabic-English bilinguals who came to the US after age twenty. The males' mean length of residence (LOR) in the US is (8; 2 years) and the females' is (5; 4 years). The males have professional careers while the females are housewives. Finally, all four subjects are speakers of Palestinian Arabic.

###### 4.1.2 Speech stimuli

The same speech stimuli and protocol that were used for the children's experiment were also used for the adults.

#### 4.2 Data analysis

The same equipment and data analysis procedure that were used in the children's experiment were also used and followed in the adults' experiment.

#### 4.3 Results

The mean, minimum, maximum, and standard deviation of the stop consonants /p, t, k, b, d, g/ for all the subjects were calculated and tabulated. The analysis will focus mainly on group results. Table (3) shows the English results for the bilingual male and female subjects across from each other.

**Table 3.** Detailed measurements for VOT means, minimum, maximum, and standard deviations in English for the adult males and females

| Stop | English/Male |        |        |        |       | English/Female |        |        |        |       |
|------|--------------|--------|--------|--------|-------|----------------|--------|--------|--------|-------|
|      | N            | Mean   | Min    | Max    | SD    | N              | Mean   | Min    | Max    | SD    |
| P    | 28           | 47.40  | 10.73  | 86.87  | 15.09 | 22             | 15.57  | -15.21 | 25.83  | 7.95  |
| T    | 20           | 50.48  | 29.80  | 89.05  | 16.33 | 20             | 34.12  | 10.14  | 117.72 | 23.77 |
| K    | 30           | 73.49  | 37.62  | 124.39 | 18.82 | 28             | 49.16  | 24.89  | 124.7  | 22.35 |
| B    | 28           | -14.38 | -89.33 | 21.71  | 37.07 | 27             | -53.83 | -167.9 | 27.38  | 61.73 |
| D    | 29           | -18.19 | -86.12 | 19.77  | 39.77 | 29             | -49.77 | -187.8 | 22.15  | 64.35 |
| G    | 22           | -2.38  | -69.47 | 28.74  | 29.98 | 23             | -41.89 | -120.1 | 35.60  | 65.09 |

Adult males' and females' English VOT values differ from those of English monolingual speakers. The English voiceless stops for the male subjects occur with values that are close to long lag and the voiced stops with voicing lead values. The VOT values of English voiceless stops are the closest in results to English monolingual speakers' VOT values in that they mostly occur with long lag, as we expect the pattern to be for the English voiceless stops. VOT values for each stop consonant vary by place of articulation. /k/ occurs with the longest lag among the voiceless stops followed by the alveolar /t/ and finally the bilabial /p/. The voiced stops have lead voicing with some tokens occur with short lag values. On the other hand, VOT patterns for the females are different from the males. English voiceless VOTs occur with short lag values while the voiced stops have voicing lead values. The females follow the males' pattern in that the velar stop /k/ has the highest values followed by the alveolar and finally the bilabial having the lowest values. For the voiced stops, the pattern is reversed with the bilabial stop /b/ occurs with the largest values followed by the alveolar and finally the velar having the smallest values. In sum, the males have larger mean values for their English voiceless stops than the females and smaller mean VOT values for their voiced stops than the females.

Generally speaking, except for the males' voiceless stops, Arabic/English bilingual adults' English VOT mean values do not follow the pattern of monolingual English speaking adults. Interestingly, the males and females in the present study show different English VOT patterns from reported values targeting gender differences in VOT. Swartz (1992) investigated American English speakers and found that women have longer VOTs for /d/ and /t/ than men. Likewise, Whiteside and Irving (1998) in a study on gender differences in British English found that women have longer VOTs for their voiceless stops and shorter voiced stop values than men. The VOT patterns of male and female voiced stops in the present study fall within ranges that differ from reported values for monolingual English speakers.

**Table 4.** Detailed measurements for VOT means, minimum, maximum, and standard deviations in Arabic for the adult males and females

| Stop | Arabic/Male |        |        |       |       | Arabic/Female |        |        |        |       |
|------|-------------|--------|--------|-------|-------|---------------|--------|--------|--------|-------|
|      | N           | Mean   | Min    | Max   | SD    | N             | Mean   | Min    | Max    | SD    |
| P    | -           | -      | -      | -     | -     | -             | -      | -      | -      | -     |
| t    | 18          | 42.33  | 20.53  | 66.96 | 13.67 | 18            | 31.21  | 14.53  | 78.09  | 18.24 |
| k    | 23          | 62.56  | 47.43  | 82.88 | 9.84  | 21            | 45.81  | 25.99  | 93.00  | 18.94 |
| b    | 20          | -57.95 | -138.9 | 7.99  | 44.68 | 20            | -91.19 | -165.3 | -57.09 | 29.96 |
| d    | 23          | -57.49 | -167.9 | 20.57 | 49.52 | 21            | -49.93 | -143.7 | 20.11  | 63.40 |
| g    | -           | -      | -      | -     | -     | -             | -      | -      | -      | -     |

The adult VOT values for the Arabic voiced and voiceless stops follow the expected pattern for the Arabic stops along the VOT continuum. As expected, the Arabic voiceless stops occur with ranges that are around short lag values and the voiced stops follow the expected pattern of Arabic voiced stops occurring with leading voice.

There is a clear pattern that differentiates VOT values of men's and women's Arabic productions. Men's mean VOT voiceless stop values are higher than women's. However, the males' values have the same pattern as females in that the voiceless alveolar stop /t/ has lower mean VOT values than the voiceless velar stop /k/ across both sexes. The Arabic voiced stops show a different pattern from the voiceless ones in that males have lower mean VOT values for /b/ than the females and higher values for /d/ than the females. All in all, the results of the Arabic voiced stops follow the expected pattern in that they occur with voicing lead values. Additionally, since there are no studies that investigated gender specific Arabic-speaking adult VOT values, the results from this study can not be compared with any results in regards to Arabic VOT values.

Arabic/English bilingual adults' VOT values are displayed in boxplot figures for the Arabic and English data. Figure (3) shows males' and females' results presented next to each other. Generally, the females' English voiceless stops have smaller ranges than those of the males' while the voiced ones occur with higher ranges than the males. Figure (4) shows the boxplot values for the Arabic stops. In general, we have more variation in the females' Arabic voiceless VOT values than the males while the voiced stops do not follow any specific pattern. The females' /b/ has less variation than the males while female's /d/ has more variation than the males'.

Previously reported ANOVA results in experiment (1) show that gender, language, place of articulation, and voicing are factors that contributed significantly to VOT values. Results from t-tests show that VOT values were significantly different between adult males and females for English /p/ ( $t = 9.59$ ,  $p < 0.001$ ), /t/ ( $t = 2.53$ ,  $p < 0.05$ ), /k/ ( $t = 4.47$ ,  $p < 0.001$ ), /b/ ( $t = 2.86$ ,  $p < 0.01$ ), /d/ ( $t = 2.25$ ,  $p < 0.05$ ), and /g/ ( $t = 2.63$ ,  $p < 0.05$ ), and for Arabic /t/ ( $t = 2.07$ ,  $p < 0.05$ ), /k/ ( $t = 3.63$ ,  $p < 0.05$ ), and /b/ ( $t = 2.76$ ,  $p < 0.01$ ) but not for /d/.

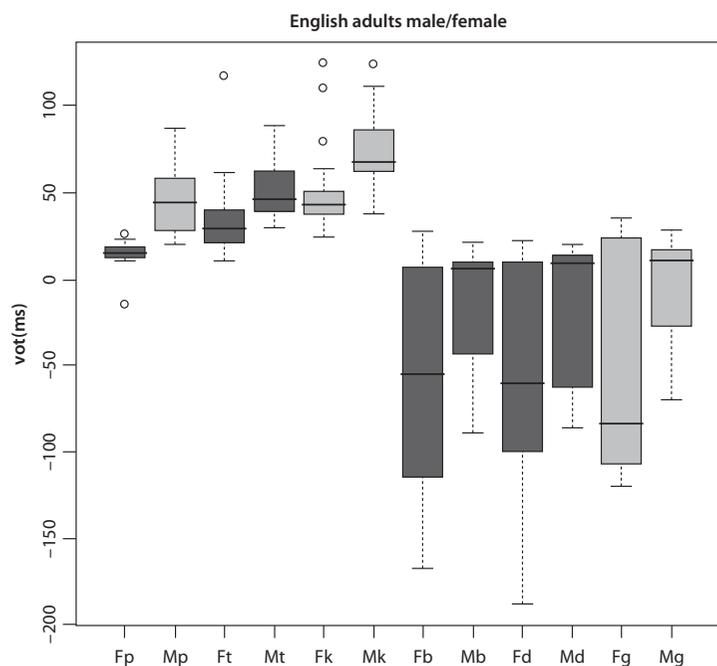


Figure 3. Boxplot of the adult female and male VOT ranges for English

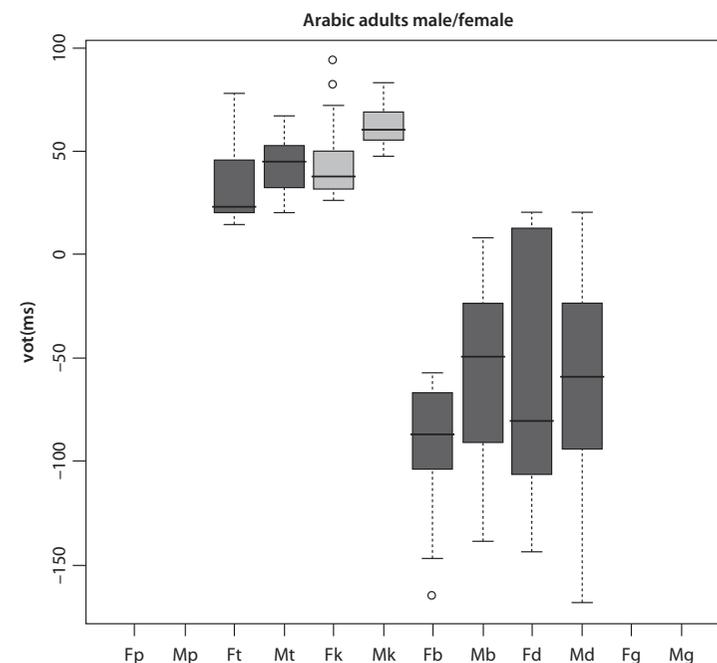


Figure 4. Boxplot of the adult female and male VOT ranges for Arabic

#### 4.5 Discussion

The results show that the males have higher voiceless VOT values for both languages than the females. On the other hand, the females have higher English VOT values for their voiced tokens than the males. As well, the females have higher Arabic VOT values for the voiced /b/ and smaller values for the voiced /d/ than the males. Karlsson et al. (2004) investigated adults as well as children and argued that Swedish adult speaker's VOT values show no difference due to gender for the aspirated stops. However, Karlsson et al. found that the voiced stops for the male speakers were produced with longer VOT values than for the females. For children, the authors concluded their study by stating that voiceless aspirated stops for female children were produced with longer VOT values than male children. In another study by Thornburgh and Ryalls (1998) that investigated Spanish-English bilingual adults, it was found that males contrasted voicing more than females and they also had more negative VOT values for voiced stops than females. Ryalls, et al. (1997) also found that American English monolingual females have larger VOT

values for their voiceless stops and smaller negative values for the voiced stops than the male subjects. Consequently, the variation among the previous studies in terms of different investigated languages makes it difficult to establish a pattern for comparison with the subjects in this study.

In general, the adult results in this study contradict those reported in the literature. If we were to consider physiological reasons behind the difference in values between male and female VOT values, then this experiment has added more ambiguity to the already scarce literature. Unlike prior work focusing mainly on monolingual speakers, this study differs significantly by investigating the voicing feature of two opposing systems through the production of bilingual speakers.

### 5. Comparing Arabic-English bilingual children and adults' VOT values

This study reveals significant overall results for age and gender differences in Arabic-English bilingual speakers' production of VOT values. If we are to consider VOT production as an indicative measure of how well speakers acquire fine-grained phonetic temporal features for their languages, then this study has provided us with support that bilingual speakers are capable of differentiating their phonetic/phonological systems and in fact show variation in regards to gender and age.

This study has provided evidence of similarities and differences across different genders and for varying age groups. For the similarity, there is a distinct pattern that differentiates males' from females' VOT values for both age groups. For the difference, both genders exhibit opposite patterns for different codes. For example, children's /t/ and /b/ values were not significantly different across genders and for languages while the same stops were significantly different for the adults' group.

In general, the results show a distinct pattern that distinguishes VOT values of bilingual children and adults in both languages. Children and adults have two different and separate phonetic/phonological systems that vary according to language. Also, it supports the claim that males' and females' VOT values differ significantly from each other. Moreover, VOT voiceless and voiced stop values vary according to place of articulation, age, and gender.

Consistent with the results reported in the literature, the female children have longer voiceless VOT values for their English tokens than the males. However, the males have longer values for the English voiced VOT tokens. Contrary to expectations, male adults have longer English voiceless VOT values than females and shorter voiced values than females. Though at first sight these results seem to contradict what is published in the literature, it can be justified if we keep in mind that

male adults in this study have more years of residence in the US than the females. Not only this, they also have professional careers so they come into contact with English monolingual speakers more than the females who stay at home and their exposure is limited to the community and through watching television. Based on this, the male adults have acquired more aspiration for voiceless stops than females which is close to the expected value for the stops but not for the gender. Though both genders did not acquire short lag for voiced English stops, as monolingual English speakers, the female values are closer to the expected pattern for Arabic voiced stops. This means that the females' values for English deviate more from the expected pattern for English than the males'. This can be attributed mainly to lack of exposure to L2, so the same phonetic system that exists for L1 has also been used for L2. Though the male subjects' English voiced values are less deviant from the expected pattern for English than the females, the results show that they still did not acquire the short lag expected value for English voiceless stops. Yet again, there is some transfer from L1 to L2 but the greater similarity of the males' results to English monolingual speakers reflects their greater exposure to English compared to females.

This study shows distinct patterns for the Arabic voiced and voiceless stops across different age groups and genders. The children's voiceless values occur with long lag and the adults' with shorter values. On the other hand, the children's Arabic voiced values occur with voicing lead but also show significant difference from the adults' whose voiced stops actually occur with higher negative values than children's. For the adults' values, the females have shorter voiceless VOT values than the males. For the voiced stops, the females have acquired more negative values for /b/ and shorter values for /d/ than the male subjects.

Generally for children and adults, we have an opposite pattern across the genders for the voiceless stops' VOT values. Female children have higher voiceless VOT values than the males while female adults have shorter values than the males. For the voiced stops, the pattern is unclear. The female children have acquired lower values for /b/ than the males while the female adults have acquired higher negative values than the males. For /d/, the female children have acquired higher negative values than the males while the male adults have acquired more negative values than the females.

Finally, this study shows that Arabic-English bilingual children were more successful in acquiring voicing contrast for both of their languages than the adults. Not only this, but they were more capable of acquiring native-like values for both codes for similar age groups than adults. This is mainly attributed to several factors. **First**, age of exposure to L2 is one of the main factors and is quite distinct across age groups in this study. While adult subjects were exposed to L2 through living in an English speaking community only when they were older than 20 years,

the children were immersed in the target community since birth. **Second**, length of residence is another important factor that affected the overall pattern that differentiated adult male from female subjects in this study. The adult males have acquired English VOT values that are closer to monolingual speakers than the adult females because they lived in the target community longer than the female subjects. **Third**, if the previous factor does not provide a fully convincing account for explaining the general pattern that differentiates males' from females' values, then the degree of exposure to L2 is certainly a more influential factor. The degree of exposure to L2 plays an important role in acquiring the target language phonetic/phonological system. There is no doubt that exposure to English speakers facilitates language learners' abilities to fine tune their L2 production. Using L2 with native speakers in the target community enables bilingual learners to get constant feedback and adjust their production – to the best of their knowledge – to standards that are deemed acceptable as well as comprehensible by native speakers.

## 6. Conclusion

Studying bilingual children's speech production provides an interesting account on how bilingual children develop two separate as well as interacting systems. This study shows that gender is an important factor in distinguishing fine-grained phonetic/phonological features between systems that bilingual children are exposed to. In general, due to physiological factors, Arabic/English bilingual girls have higher VOT values for their Arabic and English voiceless stops than boys. However, they have lower values for their Arabic and English voiced stops. Generally, these distribution patterns resemble the patterns of monolingual children reported in the literature in which girls' VOTs were longer than those of boys. Gender, place of articulation of the stop, and age are interacting factors that contribute to VOT value assignment. Though the adults' data did not follow the same pattern as that of the children, it provided empirical evidence of gender differences in VOT values for different languages. It also provided evidence for bilingual children's abilities to acquire, simultaneously, two contrasting phonetic/phonological codes.

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# Phonological processing in diglossic Arabic

## The role of linguistic distance

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Arabic native speaking children are born into a unique linguistic context called *diglossia* (Ferguson 1959). In this context, children grow up speaking the specific spoken variety of Arabic used in their immediate environment (hereafter, Spoken Arabic, SpA). At school, they are formally exposed to a different, yet linguistically related variety, Standard Arabic (hereafter, StA) which is the variety encoded in print. SpA and StA are phonologically distant, with some phonemes used only in StA but not in SpA. This paper reviews recent research examining the effect of the phonological distance between StA and SpA on children's phonological processing. The results obtained from a series of studies indicate that phonological processing among children is directly affected by the phonological distance between the two varieties. This effect emerges even in the presence of accurate articulation of distant phonemes; it surfaces in phonological production as well as phonological recognition tasks, and it persists across the early grades. The effect of the phonological distance on phonological processing in Standard Arabic is argued to be attributed to low-quality phonological representations.

The term '*diglossia*' emerged in sociolinguistic theory to describe a situation, where in a given society there is more than one language variety in use (Ferguson 1959). Ferguson proposes a classification of diglossic features that include function, prestige, literary heritage, acquisition, standardization, stability, grammar, lexicon, and phonology. According to Ferguson, a diglossic context is characterized by a stable co-existence of two linguistically-related language varieties, a High variety and a Low variety, that are used for two sets of complementary social functions; Such rigid functional complementarity, it is argued, gives way only to slight and insignificant overlap (Maamouri 1998). In a diglossic context, no section of the community uses the High variety for ordinary conversation. This is arguably "the most important factor in a diglossic situation and one that makes for relative stability" (Keller 1982, p. 90).

In a diglossic context, the two language varieties are associated with different degrees of prestige. The High variety is considered prestigious and elegant; It is

used for formal linguistic functions, such as religious sermons, news broadcasts, speeches, etc. and is the only conventional written variety. The Low variety is stigmatized as a literary form and is exclusively spoken.<sup>1</sup> The High variety is usually associated with a rich literary tradition and is the standardized form that is encoded in dictionaries and books. As it is only written, the High variety is nobody's mother tongue. Instead, it is the Low variety that children acquire as their first language. Stability is another important feature of diglossia as a long-lived phenomenon. Finally, in a typical diglossic context, the two varieties of the language are linguistically related, though the phonology, morphology, and syntax of the Low variety are often simpler than that of the High variety. Hence, a diglossic context is also characterized by the existence of a large set of paired lexical items, or SpA-StA cognates, which exist in both varieties, yet have distant phonological forms in each of them.

### 1. Arabic diglossia

Perhaps one of the most unique features of Arabic is its diglossic nature (Al-Batal 1992, Al-Toma 1969; Haeri 2000). The most important feature of diglossia, and one that has a direct impact on language and literacy development in Arabic, is the establishment of rigid and complementary functional separation of two language varieties: the written and the spoken. The standardization of Arabic, which began in the 8th and 9th centuries A.D. has produced a set of norms that the early grammarians called *fusha* (Maamouri 1998). Over the course of many years, the continued use of this favored set of written linguistic norms led to substantial differences between the dynamic spoken vernaculars and the fixed written form, making the two varieties distinct and linguistically distant. Such linguistic distance, together with the limited, primarily literacy-related function of Standard Arabic, has reinforced the socio-functional 'compartmentalization' and the diglossic stability of Arabic (Walters 1994). This is because it has made achieving high levels of linguistic proficiency in Standard Arabic a formidable task. Lack of spontaneity and artificiality in the use of Standard Arabic (Sleiman 2002) has also contributed to furthering avoidance of Standard Arabic. In the Israeli Arabic scene, the situation is exacerbated by the competition with Hebrew,

1. It is noteworthy that spoken Arabic is widely used in the informal writing of electronic messages, such as SMS messages, among young Arabic native speakers across the Arab World (Myhill 2008).

the official and dominant language of the country reducing, hence, the perceived vitality and functionality of Standard Arabic (Amara & Mar'i 2002).

Another unique feature of diglossia that has direct ramifications for language and literacy development in Arabic is the process of acquisition. While all Arab children naturally acquire the local spoken vernacular of the speech community to which they belong, learning the written standard comes about mainly as a result of formal instruction in reading (Ayari 1996). Thus, Standard Arabic is nobody's mother tongue (Coulmas 1987; Joseph 1987). It is typically never spoken at home or in the neighborhood. It is argued that, the fact that the functional distribution of codes in a diglossic context protects the role of the Low variety as a natively learned variety is what distinguishes diglossia from other interlingual or intralingual situational alternation (Hudson 2002, p. 7).

### 2. Phonological distance

All spoken Arabic vernaculars are linguistically related to Standard Arabic. Yet, despite linguistic relatedness between the two language varieties, a linguistic analysis of the structure of Standard Arabic and any given spoken Arabic vernacular reveals differences in all language domains: phonology, morphology, syntax, and lexicon. One predominant aspect of the linguistic distance between SpA and StA is phonological. Saiegh-Haddad & Ali (2009) analyzed the spoken lexicon of five-year-old Arabic native speaking children. The children spoke a local dialect of Palestinian Arabic vernacular spoken in the north of Israel. A total of 4,400 word types derived from a corpus of 17,500 word tokens were analyzed and the linguistic distance between each spoken word and its corresponding form in Standard Arabic was qualified. The results showed that 40% of the spoken Arabic words analyzed had phonologically related cognate forms in Standard Arabic and that these cognate words (or paired-lexical items) were different in 1–6 phonological parameters each, with sound change, sound addition and sound deletion characterizing the phonological distance between the two forms (Ali 2009). The results also showed that only 20% of the words that children produced had identical forms in SpA and StA,<sup>2</sup> and 40% of them had a unique lexical form in StA.

One manifestation of the phonological distance between SpA and StA words is a direct result of differences in the consonantal inventories of the two language varieties. Although StA shares most of the phonemes with all spoken vernaculars, no single spoken vernacular has the same set of phonemes as StA

2. The standard forms of words did not include inflectional endings.

(Maamouri 1998). For example, while the phonemic inventory of StA includes three interdental fricative phonemes: voiced /Δ/, voiceless /T/, and emphatic /Δʔ/, all three phonemes are absent from many Palestinian Arabic vernaculars spoken in the north of Israel. As a result, paired lexical items, or cognate words have different phonological representations in the two varieties with these phonemes systematically substituted for by parallel SpA phonemes. For instance, the interdental phonemes: voiced /Δ/, voiceless /T/, and voiced emphatic /Δʔ/ typically have the voicing-equivalent plosive dentals in this vernacular: /δ/, /τ/, and /δ=/. Hence, the StA word /Δακ↔ρ/ (male) is /δακ↔ρ/ in this vernacular. Similarly, the StA word /T/αλ↔β/ (fox) is /ταλ↔β/, and //αΔ=αϕEρ/ (nails) is //αδ=αϕEρ/.

Another manifestation of the phonological distance between SpA and StA occurs in the phonotactics of the two varieties. That is, in the rules that govern the syllable-internal identity and order of phonemes. As such, different constraints govern the internal phonological composition of the syllable in StA and SpA. For instance, while prevocalic (onset) consonantal clusters are not permissible in StA, they are quite frequent in many spoken Arabic vernaculars. As a result, in these vernaculars, the StA word /τYρα|β/ has the phonological structure /τρα|β/ ('soil') with a complex onset. At the same time, while postvocalic (coda) consonantal clusters are rare in SpA, these are very common among StA monosyllabic words. This explains why the StA word /σαηλ/ (plain) has the structure /σαη|λ/ in some SpA vernaculars, or why the StA word /TαλZ/ (snow) is /τσαλ|Z/, with both the segmental and the syllabic structure of the word altered in accordance with the phonological constraints of the specific spoken vernacular.

### 3. The psycholinguistics of phonological distance in diglossic Arabic

Phonological processing skills are key to vocabulary acquisition and reading (Ziegler & Goswami 2005; Perfetti 2007; Wagner & Torgesen 1987). Phonological processing depends on the accuracy and the segmental organization of the underlying phonological representations of words (Elbro 1996, 1998; Goswami 2000; Katz 1986). This is a major tenet of the *Lexical Restructuring model* (Metsala & Walley 1998; Walley, Metsala & Garlock 2003). According to this model, the phonological representation of words is not inherently segmental. Rather, it is word-specific and is a byproduct of vocabulary growth and of experience with words. This implies that the socio-cultural context in which language and literacy acquisition is embedded affects the development of phonological representations, especially of low-frequency and literacy-related words. Experience with the language of literacy, or the written language, should enhance phonological representations for these words boosting, hence, the language and literacy processes predicated on them.

In diglossic Arabic there is a rigid socio-functional separation between the oral language and the written language. Besides, the two language varieties are remarkably distinct, especially in the phonological domain (Saiegh-Haddad & Ali 2009). The following section reviews psycholinguistic evidence pertinent to the effect of the phonological distance between SpA and StA on phonological processing in Arabic.

Saiegh-Haddad (2003) tested the effect of the phonological distance between StA and a local Arabic vernacular spoken in the north of Israel on phonological awareness among kindergarten (N=23) and first grade (N=42) Arabic native speaking children. The study examined the effect of the linguistic affiliation of the target phoneme (StA phoneme versus SpA phoneme) and the linguistic affiliation of the syllable in which the phoneme is embedded (StA CVCC versus SpA CVCVC) on initial and final phoneme isolation. An analysis of the children's phoneme isolation performance showed that first grade children outperformed kindergarten children on both initial and final phoneme isolation tasks and with no task by grade interaction. An analysis of the children's performance on contrastive StA versus overlapping SpA phonemes revealed that the linguistic affiliation of the target phoneme (StA vs. SpA) reliably predicted children's phoneme isolation performance. As such, despite proper articulation, both kindergarten and first-grade children found StA phonemes significantly harder than SpA phonemes to isolate, both in word initial and word final positions. The study also showed that StA phonemes embedded within StA syllables were more difficult than those embedded within SpA syllables in the initial phoneme isolation task. These results were interpreted as reflecting a deficiency in the phonological representations of StA phonological structures (phonemes and syllables) (Elbro 1996, 1998; Goswami 2000, 2002).

Given consistent evidence in favor of the impact of the diglossic linguistic distance on children's phonological awareness for contrastive StA phonological structures, Saiegh-Haddad (2003) also tested the impact of phonological distance on pseudo word decoding among first graders. In particular, it examined whether the decoding of pseudo words that embodied StA phonemes was more difficult than the decoding of words that embodied only SpA phonemes. There were two types of pseudo words: pseudo words that consisted of SpA phonemes only, and pseudo words that consisted of SpA phonemes and only one StA phoneme in an initial or a final position. The syllable structure of the pseudo words was either spoken Arabic CVCVC or Standard Arabic CVCC. The study tested the effect of the linguistic affiliation of the phoneme (StA versus SpA) and the word syllabic structure (StA versus SpA) on first-grade children's (N=42) pseudo word decoding accuracy. The results showed that, despite rather high rates of decoding accuracy, a large percentage of the decoding errors committed by children were related to StA phonemes and StA syllables. As such, children's errors reflected difficulty in the phonological recoding

of StA phonological structures. In contrast, overlapping SpA phonemes and SpA syllabic structures were almost perfectly decoded. Given the transparent orthography of voweled Arabic, the high decoding accuracy that children had revealed was not surprising. The regular and consistent orthographic representation of oral language phonemes encourages the use of a phonological mechanism in reading and makes word decoding a straightforward task (Seymour, Aro, & Erskine 2003). Given such a decoding mechanism, and as some of the letters map onto novel StA phonemes, it reasonably follows that the great majority of the children's decoding errors should be bound to StA phonological units.

The phonological distance between spoken and standard Arabic manifests itself forcefully in the linguistic distance between the phonological representations of paired lexical items (cognates) in StA and SpA. Paired lexical items exist in both varieties: the written and the spoken. Yet, they have distinct, though related phonological representations in each of them, e.g. /Tα\λ↔β/ versus /τ\λ↔β/ (fox) or /Tα\λZ/ versus /τ\λ\Z/ (snow). In the majority of cases, it is possible to computationally recover the spoken representation of a cognate word from its representation in the standard variety, and vice versa. This may be performed by applying a set of systematic phonological transformations, such as inserting an epenthetic vowel or substituting one phoneme for another. Given this unique lexico-phonological feature, the question that the next study addressed was whether lexicality plays a role in phonological analysis. That is, whether phonological analysis in StA benefits from lexical feedback, or familiarity with the target word (Saiegh-Haddad 2004). This question was addressed by testing the effect of the lexical status of the word (SpA, StA, or pseudo), as well as the linguistic affiliation of the target phoneme (SpA vs. StA) on initial and final phoneme isolation among kindergarten (N=24) and first grade (N=42) Arabic native speaking children. The results showed that, when words were composed of SpA phonemes only, the lexical status of the word did not affect phoneme isolation. However, when words consisted of both SpA and StA phonemes, kindergarten children found phonemes embedded within StA words significantly more difficult to isolate than those embedded within pseudo words. Further, StA phonemes embedded within StA words were the most difficult for kindergarteners to isolate. These results converge in supporting the proposed low-quality phonological representations of Standard Arabic words.

Saiegh-Haddad (2011) tested the phonological representations of Standard words among 4–6 year old children using word repetition and object naming tasks. The words used were all cognates that were familiar to children in their spoken form. The Standard phonological representation of these cognates was different from its spoken representation either in one consonantal phoneme, in the syllabic structure, or in both. The results showed that, despite a significant developmental

progression, the phonological representation of StA words (reflected in repetition and naming) varied with the type and degree of phonological distance. As such, children found it more difficult to repeat and retrieve cognate words that were distant in a consonantal phoneme than in the syllable structure (epenthetic vowel distance). Cognates depicting both types of distance were the most difficult for children to repeat and name accurately. This provides evidence in support of the direct link between phonological distance and the quality of phonological representations in diglossic Arabic.

The evidence reviewed thus far (Saiegh-Haddad 2003, 2004) shows that contrastive StA phonological structures pose a challenge to the proper development of phonological representations and to phonological processing in Arabic. Yet, the aforementioned studies have all been conducted within the same spoken vernacular – a local form of Northern Palestinian Arabic vernacular spoken in the north of Israel. In this vernacular, four standard consonantal phonemes are not within the spoken vernacular of children. These are the voiced interdental fricative phoneme /Δ/ (as in the beginning of the English word 'then'), the voiceless interdental fricative phoneme /T/ (as in the beginning of the English word 'thin'), and the voiced emphatic interdental fricative phoneme /Δ= (which is close in articulation to the allophonic variant of the English phoneme /Δ/ heard in the beginning of the word 'thus'), as well as the uvular stop /θ/ (which is close in articulation to the allophonic variant of the English phoneme /κ/ heard in the beginning of the word 'clip'). Phoneme awareness performance obtained from children speaking this vernacular showed that these four StA phonemes were significantly more difficult to isolate than SpA phonemes.

Saiegh-Haddad (2007) addressed the cross-dialectal validity of this finding against the competing hypothesis that phoneme identity was to blame for children's difficulty in isolating the four critical StA phonemes. It compared the phoneme isolation performance of two groups of children speaking two geographically and phonologically distinct vernaculars (N=256). The first group (N=54) spoke the same SpA vernacular that had been targeted by earlier research – a local form of Northern Palestinian Arabic vernacular spoken in the north of Israel. The second group (N=202) spoke a local dialect of the Central Palestinian vernacular spoken in central Israel. This latter vernacular incorporated all of the four critical phonemes that were absent from the former. The phoneme isolation performance of children from these two SpA backgrounds was compared. It was reasoned that if children in the two groups differed in their phonological sensitivity towards these four phonemes, as against other phonemes, it would be reasonable to conclude that the availability of the phoneme in the spoken vernacular of children was to blame. This finding would offer support for the linguistic affiliation hypothesis. If, however, both groups revealed comparable sensitivity toward these four

phonemes, then the phonological identity hypothesis would be supported. The results showed that the same phoneme may be associated with different degrees of difficulty, depending on whether it is or it is not within the child's spoken vernacular. This factor, formalized as the *Linguistic Affiliation Constraint*, was found to reliably predict children's phoneme isolation performance between kindergarten and the 2nd grade. Yet, it fell below satisfactory levels of statistical significance in the third grade.

The evidence available, then, clearly shows that contrastive StA phonemes which are not within the spoken vernacular of children are more difficult for them to access than phonemes available to them from their oral language. This is so regardless of the phonological identity of the phoneme, and despite proper articulation. Yet, earlier research has used phoneme isolation tasks that required oral production of the target phoneme. Hence, even though only those children who had not demonstrated difficulty in articulating the critical standard phoneme were tested, the possibility that phonological production at the output phonological stage was responsible for the observed difficulty in isolating StA phonemes was hard to definitively rule out. In the light of that, it was important to replicate these findings using a task that did not require phonological production. This was the objective of the following study.

Saiegh-Haddad, Levin, Hende, & Ziv (2011) tested phoneme awareness among 60 preliterate Arabic native speaking children using a phoneme recognition task that does not involve phonological production. Children were presented with triplets of pictures that represented line drawings of highly familiar objects. The three words were presented in a triangular form, a target word at the top and two options at the bottom, and participants were required to point to the word at the bottom that began with the same phoneme as the target word at the top. The target words in the testing triplets were of two types. The first was target words that began with a SpA phoneme. The second was target words that began with a StA phoneme. Comparing children's phoneme recognition performance on the two types of items revealed that StA phonemes were more difficult for children to recognize than SpA phonemes. This finding extends earlier evidence using phonological production tasks (Saiegh-Haddad 2003, 2004, 2007), and supports the validity of the *linguistic affiliation constraint* in predicting phonemic awareness in diglossic Arabic. According to this constraint, the same phoneme may be associated with variable degrees of awareness among Arabic native speaking children. This variability is attributed to the presence/absence of the phoneme from the spoken vernacular of children, with standard phonemes that are not affiliated with the spoken vernacular of children and, hence, not within their oral language, significantly more difficult for them to access in a phoneme awareness task. These findings suggest that StA phonological structures are associated with

low-quality phonological representations. Phonological representations are directly implicated in language and reading development (Elbro 1996, 1998; Goswami 2000, 2002; Perfetti 2007; Thomas & Senechal 2004).

#### 4. Conclusion

Strong linguistic skills are associated with better reading outcomes. Phonological processing skills are foundational to reading development. Given the diglossic context of Arabic and the remarkable phonological distance between the spoken and the standard varieties, the current chapter addressed the impact of phonological distance on phonological processing in children. This examination is one step into the inquiry of how the linguistic disparity between spoken Arabic and the language of literacy might factor into the unfortunate literacy failure of Arabic native speaking children (Maamouri 1998).

Despite frequently articulated concerns over the possibility that diglossia may be to blame for the widespread illiteracy in the Arab World (Ayari 1996) and claims, explicit or implicit, by others that the acquisition of reading in Standard Arabic may be comparable to literacy acquisition in a foreign or a second language (Abu-Rabia 2000; Ibrahim 1977, 1983), the direct impact of the linguistic distance between spoken and standard Arabic on the acquisition of literacy has only recently begun to attract empirical attention. The studies reviewed here converge in demonstrating that the phonological distance between SpA, which children acquire as a mother tongue, and StA, which is acquired primarily as a result of formal instruction in reading, does not support the development of high-quality phonological representations of Standard Arabic words. (Saiegh-Haddad 2003, 2004, 2007, 2009). This is because it requires the construction of novel phonological categories that are not within the child's spoken variety. The construction of novel phonological categories is compounded by the socio-functional separation of the two varieties which curtails the opportunities for practice and use of the standard language and results in insufficient acquaintance with the phonological system of the language encoded in print. It follows from this that systematic exposure and explicit mediation of the linguistic relatedness between the two varieties should enhance the construction of high-quality phonological representations and lessen the impact of phonological distance (Abu-Rabia 2000; Levin, Saiegh-Haddad, Hende, & Ziv 2008). The efficacy of such programs for furthering Arab children's acquisition of basic literacy skills is for future research to pursue.

Finally, it is to be remembered that the findings reported in this chapter are valid in the Arab-Israeli scene. The linguistic experiences of Arabic native speaking children in the Arab World may be different. Future research should

attempt a replication of the currently reviewed research in other parts of the Arabic speaking world.

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## Early acquisition of SVO and VSO word orders in Palestinian Colloquial Arabic

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This study explores the acquisition of Subject-Verb- Object (SVO) and Verb- Subject-Object (VSO) structures in Palestinian Colloquial Arabic (PCA) using a repetition task to examine the production of these structures in a group of fifteen typically developing children aged 1:7–3:0. The findings indicate that the VSO order is mastered early, and is preferred over SVO by the young age groups. SVO order, on the other hand, appears late, even though it is the more frequent order in the adult target language. These findings are explained within the framework of head and phrase movement acquisition. Children acquire verb movement before they acquire Noun Phrase NP movement, and therefore succeed better with VSO sentences that involve only verb movement, than with SVO sentences that involve NP movement as well. With age, having mastered both types of movement, children shift to predominantly use the more grammatically complex SVO structure, which is the preferred and more abundant structure in the dialect.

### 1. Introduction

#### 1.1 Arabic language acquisition studies

A cursory review of linguistic research in Arabic reveals a scarcity of studies on colloquial Arabic dialects, specifically in the domain of language acquisition. This could be underlined by the resistance of traditional grammarians to study colloquial Arabic due to their view that Classical Arabic and/or Modern Standard Arabic are the only languages worthy of analysis. It is now acknowledged that the use of modern linguistic theory contributes to our understanding of the Arabic language, and the study of colloquial dialects, specifically by modern cognitive linguists who are interested in natural languages, has become more accepted (Elgibali 1996).

The literature on language development for Arabic-speaking children is scarce. There are few published studies on language acquisition in children native speakers of Arabic (Al-Akeel 1998; Amayreh & Dyson 1998; Ravid & Farah 1999;

Elgibali 2003; Ravid & Hayek 2003). Most of these studies are descriptive in nature and focus on investigating the development in the phonological domain (Amayreh & Dyson 1998; Hamdan & Amayreh 2007; Saeigh-Haddad 2005, 2007), the morphological domain (Ravid & Farah 1999; Elgibali 2003), all language domains (Omar 1973), or the development of diglossic knowledge (Dyson & Amayreh 2000; Abu-Rabia, Share, & Mansour 2003; Saeigh-Haddad 2003, 2004; 2005; 2007. Khamis-Dakwar 2007).

This study aims to describe the order of acquisition of SVO and VSO structures in Palestinian Arabic-speaking children, in light of the underlying linguistic representation of each structure.

### 1.2 SVO and VSO word orders in Arabic

Two orderings of subject and verb exist in Arabic (both colloquial and standard): Subject-Verb-Object (SVO) and Verb- Subject-Object (VSO) (Benmamoun 1992; Fassi-Fehri 1993; Shlonsky 1997). These two types of sentences alternate in Palestinian Colloquial Arabic (PCA).<sup>1</sup> In principle, the child can use either type of sentences to convey the same meaning as examples (1) and (2) show.<sup>2</sup>

- (1) *el-binet aklat tuuti kbiir-i* (SVO)  
The-girl ate-3.SG.FEM strawberry big -FEM  
The girl ate a big strawberry
- (2) *aklat el-binet tuuti kbiiri* (VSO)  
Ate-3.SG.FEM the-girl strawberry big-FEM  
The girl ate a big strawberry

If we assume, following Benmamoun 1992, 1997; Fassi-Fehri 1993; Mohammad 2000; Shlonsky 1997, and Oualla 1994 that the base-generated order within the Verb Phrase VP in Palestinian Arabic is SVO, then the derivation of VSO sentences involves only verb movement, while the derivation of SVO sentences involves both verb movement and Noun Phrase NP movement. Specifically, in order to derive VSO, the head V raises to I<sup>0</sup> (a functional head, probably T<sup>0</sup>). This is a case of *head movement* (Figure 1). The derivation of SVO includes both the head movement of V to I<sup>0</sup>, and the movement of the NP subject from Spec-VP to Spec-IP, to a position before the moved verb. This is an instance of *NP movement* (or A chain) (Figure 2)

1. Benmamoun suggests that even though it is optional to use the two structures in colloquial Arabic, it is related to the tense. SVO is the unmarked structures in the present tense and the VSO in the past tense in colloquial Arabic.

2. In Classical Arabic there is no optionality between SVO and VSO structures.

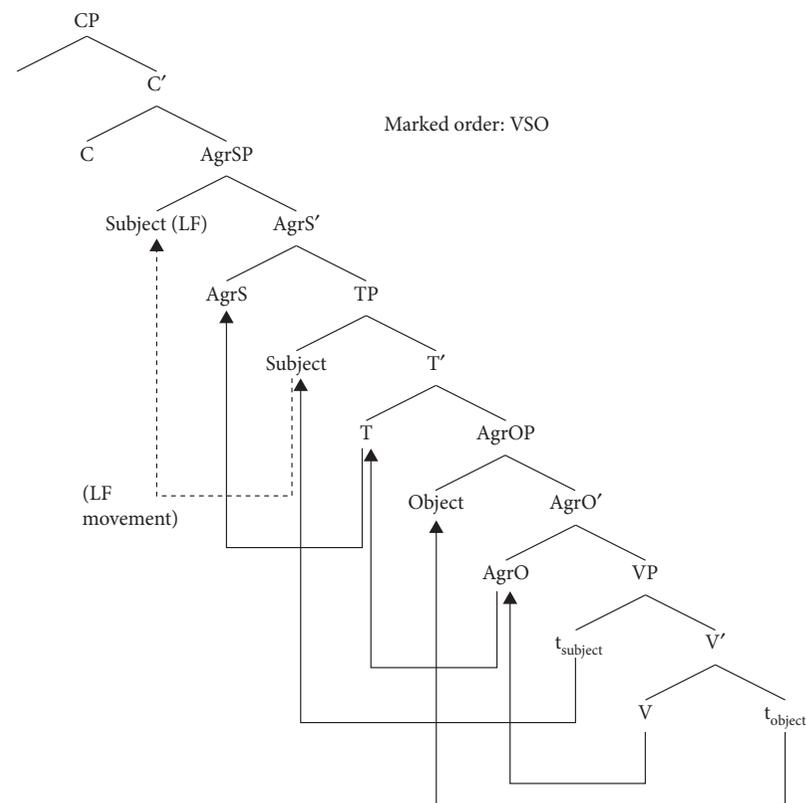
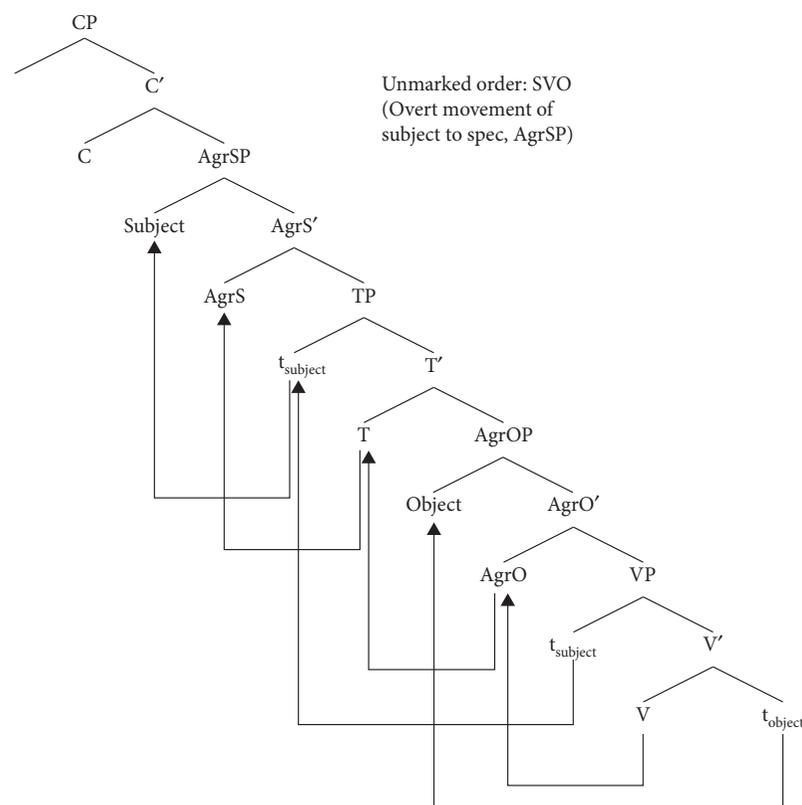


Figure 1. A syntactic representation of a VSO sentence in PA. The verb moves to I<sup>0</sup>

It is fairly established that there is a universal order of acquisition of different types of movement. A uniform order of acquisition exists in many structural properties both between individuals and cross-linguistically (Meisel 1995). With respect to the acquisition of movement, Borer and Wexler (1987) claimed that A-chains, or NP-movement, develop late in the course of language acquisition, later than head movement.

If this late acquisition of NP movement relative to head movement holds across languages, we would predict it to be the case in Palestinian Arabic as well. Namely, we would predict that structures that involve head movement will be mastered before structures that involve NP movement. Given that VSO structures involve only verb movement, and SVO structures involve NP movement as well, the prediction is that VSO structures would be acquired before SVO structures.



**Figure 2.** A syntactic representation of an SVO sentence in PCA. The verb moves to I<sup>0</sup> and the subject to spec-IP

However, if frequency of observations (markedness),<sup>3</sup> rather than movement types, is the factor that determines order of acquisition, then given that SVO is the unmarked structure whereas VSO is marked in PCA (Shlonsky 1997), markedness theories would predict that children acquire SVO structures earlier than VSO structures. This study will investigate empirically the order of acquisition of VSO and SVO structures in PCA, providing a test case that will help examine the order of acquisition of the two types of movement and determine between these two contradictory accounts.

3. Markedness in this paper refers to the frequency of exposure to a specific structure and not to the syntactic notion of markedness. This notion is commonly referred to in the speech language pathology assessments.

## 2. Method

For the purposes of this study a sentence repetition task was devised. In this task children were asked to repeat either an SVO sentence or a VSO sentence. The sentence types were incorporated in a symbolic play with different animals, pictures of a bear doing various activities, and short stories. The children were specifically asked to repeat the sentences to a rabbit-puppet. The child was told that the puppet was very shy and does not speak or listen to adults. The experimenter told the child that she wants the rabbit to join and play but it does not listen to her. The experimenter suggested that the child repeats the sentences to the puppet so it can also enjoy the play-time. This method was devised after Crain and Nakayama (1987) which approximates real life situations and increases the child's cooperation.

The task of sentence repetition is considered problematic with children since it is often difficult to separate between the sentences that child repeats after the adult (i.e. pure imitations), and his/her state of language knowledge. However, repetition tasks enable us to see what children *do not know*. That is, if children systematically produce erroneous repetitions, this would be strong evidence that these sentence structures are problematic for them. Moreover, sentence repetition has been found to be specifically sensitive and appropriate to use with young children (compared to children older than 6 years old), in which the grammatical productions elicited in sentence repetition task are highly correlated with grammatical productions elicited in free speech sampling (Devescovi & Caselli 2007).

### 2.1 Participants

Fifteen monolingual native PCA-speaking pre-school children (7 girls and 8 boys), ranging from 1;7 to 3;0 years participated in the study. The children were divided into three age groups of five children each: 1;7–2;0, 2;2–2;5, and 2;6–3;0. None of the participating children had hearing, health, behavioral, or developmental problems, based on reports of the kindergarten teacher and the parents.

### 2.2 Procedure

As a preliminary stage, the experimenter visited the daycare four times before administering the experiment. At these visits the experimenter played with the children, told them stories and participated in the activities of the daycare. This was to establish mutual familiarity. In the fifth visit the experimenter approached children individually and proposed to the child to come and play with her in a separate quiet room. The children participated at will in the experiment and they were told that they could stop whenever they wanted.

The experiment consisted of three parts, each administered on a separate day. The first part was the symbolic play. In this part the child and the experimenter

played with familiar animals, and with a boy puppet, a girl puppet, feeding and cleaning tools and other familiar objects. The child chose a character and a tool representing the activity s/he wished the character to perform. The child then played out the activity which the experimenter later described in simple SVO or VSO sentences. The order of the presentation of sentence types was randomized and counterbalanced throughout the experiment to account for possible order effects on the child's performance. The child was then asked to repeat the exact sentence to the puppet-rabbit so that it, too, would enjoy the playtime. The puppet was controlled by the experimenter and reacted to the repeated sentences to show the child that the puppet was listening carefully to what he/she was saying. Positive reinforcement was given to the child by the experimenter irrespective of the accuracy of repetition.

The second part was picture description. The experimenter presented the child with 30 pictures of the game "Parlons avec ploum" in which a bear performs various activities. The experimenter showed the child one picture at a time and described the activity in that picture in either an SVO or a VSO sentence. The child was then asked to repeat the sentence to the puppet.

The third part was storytelling. In this part the experimenter read two stories to the child: the story of the five balloons and the story of Rasha's hat. The experimenter flipped through the story one page at a time and described the event using simple SVO or VSO sentences. The child was asked to repeat the sentences to the puppet so it could enjoy the story too.

### 2.3 Material

Sentences were presented in either SVO or VSO order. All sentences included full NP subjects (no pronouns). After subtracting sentences the children did not repeat at all, the first and the second age groups repeated 217 sentences each, and the oldest age group repeated 225 sentences.

### 2.4 Coding

The child's sentence repetitions were recorded and later transcribed and analyzed. The children's overall responses, in their respective age group, were classified into three response categories – correct imitation, inversion and other responses to either SVO or VSO sentences. Responses were coded as correct imitation responses if the child repeated the presented sentence verbatim. Responses were coded inversion responses if the child's response was an inversion of the presented sentence type. All other responses, which included null subjects and one-word responses (mainly object names), were coded as other responses.

### 3. Results

The differences in response types within and across age groups were calculated using t-tests and repeated measure of variance. The most prominent finding was that in the youngest group (ages 1;7 to 2;0), children could repeat VSO but not SVO sentences. The youngest child, age 1;7, could not repeat correctly any of the 38 sentences he heard, and was therefore excluded from the analysis (as cited in Friedmann & Khamis-Dakwar 2002). In the first age group, 58% of the responses to VSO sentences were correct imitations, compared to only 2% for the SVO sentences (significant difference between sentence types ( $t(4) = 4.25, p = .007$ , missing data point was replaced with the group mean). No inversion errors were witnessed in VSO repetition, while in SVO repetition, 29% of the responses were inversions of SVO to VSO (significantly more inversion errors in SVO than in VSO  $t(4) = 2.33, p = .04$ ).

**Table 1.** Imitation of SVO and VSO sentences – percentage (Standard deviation, number of sentences out of total sentences of this type)

| Age group | SVO               |                    | VSO               |                    |
|-----------|-------------------|--------------------|-------------------|--------------------|
|           | Correct Imitation | Inversion Response | Correct Imitation | Inversion Response |
| 1;8–2;0   | 2% (3,2/127)      | 29% (32,37/127)    | 58% (35,52/90)    | 0% (0,0/90)        |
| 2;3–2;5   | 33% (26,41/125)   | 14% (9,17/125)     | 42% (14,39/92)    | 8% (8,7/92)        |
| 2;6–3;0   | 67% (31,86/128)   | 3% (4,4/128)       | 40% (18,39/97)    | 27% (19, 27/97)    |

In the second group, children had still more correct imitations of VSO sentences than of SVO, and more inversion responses of SVO to VSO than of VSO to SVO. However, at this age, these differences between sentence types were no longer significant.

In the third group, the pattern changed, and children had more correct imitation responses to SVO than to VSO sentences. In addition, inversion responses of SVO to VSO almost disappeared, and there were more inversion responses of VSO to SVO. Both differences were marginally significant ( $t(4) = 2.34, p = .04$ ;  $t(4) = 2.42, p = .04$ ).

With respect to differences between the age groups, a pairwise t-tests for independent samples analysis revealed that there were significantly less correct imitation of SVO in the first age group than in the second age group ( $t(8) = 2.62, p = .02$ ), and less correct SVO correct imitations in the second than in the third age group ( $t(8) = 1.89, p = .047$ ). There were also differences among the groups regarding inversion responses to SVO sentences. There were significant differences between the third and the second age group regarding inversion responses to SVO sentences

( $t(8) = 2.09, p = .004$ ) as well as with the first group ( $t(8) = 2.53, p = .02$ ), but there were no significant differences between the first and the second age groups.

Regarding children's correct imitation to VSO there were no significant differences between groups ( $p > .1$  for each of the three comparisons). However, there were differences among the groups regarding inversion responses to VSO sentences. Specifically, there were significantly more inversion responses to VSO sentences in the first than in the second age group ( $t(8) = 2.21, p = .03$ ), and significantly more often in the second than in the third age group ( $t(8) = 2.13, p = .03$ ).

#### 4. Discussion

The most striking finding of this study is that at the early stages of language acquisition, PCA-speaking children preferred the VSO structures over the more frequent SVO structure. This was manifested both in the very small number of correct repetitions of SVO compared to VSO in the youngest group, and in the tendency to produce VSO instead of target SVO sentences in the same group (and not vice versa).

We suggest that the later mastery of SVO order is due to the late acquisition of NP movements, in line with Borer and Wexler (1987). Given that NP movement is unavailable to the young children, but V movement is, they move the verb to a position before the subject, but fail to move the subject to a position before the verb, therefore they end up producing VSO sentences, also instead of SVO sentences. We assume that in these sentences the subject remains in its base-generated position within the VP.

If we accept this explanation (i.e. lack of XP movement) as the likely reason for the children's preference of VSO over SVO in the early stages of language development, the study's results provide further evidence for the universal order of movement acquisition. While these findings are consistent with previous claims regarding the acquisition of movement, they cannot be explained within the framework of markedness-determined acquisition. PCA-speaking children, as seen in Table 1, acquire the marked (less frequent) VSO order first, contrary to the markedness claims that children initially acquire the unmarked (more frequent) structure. In this respect, Meisel (1995) proposes that markedness is not defined by the grammar but by some external criteria. Hence it can be argued that markedness theory is not applicable to explaining children's acquisition of the grammar (see also Hyams 1986).

The study's results (Table 1) show that with age there is an increase in correct imitation responses to SVO but a decrease to VSO structures. Additionally, there was a decrease in inversion responses to SVO but an increase to VSO structures.

These trends suggest that there is a shift in children's preference from VSO to SVO structures. This can be explained in that children's preference of VSO over SVO in the early stages stems from grammatical constraints (i.e. the inaccessibility of XP movement), whereas the observed shift in preference for structure types in the later stages can be attributed to pragmatic constraints. With respect to the latter explanation, the SVO structure is considered to be the unmarked and the dialectically preferred structure in PCA (Shlonsky 1997). Hence children at the ages of 2:6–3:00 years begin to produce more SVO structures.

This study exemplifies the need to further study language acquisition in Arabic to enhance our understanding of the theoretical linguistic representation of Arabic structures. This knowledge is essential for speech language pathologists to use for assessing children with language delay/disorder in Arabic.

Resources used by speech language pathologists (SLPs) to assess a child's speech and language skills are mainly translated versions of English resources based on the data gathered on language development in English within dominant society fractions (Algibali 2003; Wiig & El-Halees 2000; Yaakobi, Hadie, & Khamis-Dakwar 2003, Khamis-Dakwar 2005; Patel & Khamis-Dakwar 2005). Consequently, false negative identifications are numerous and clinical decisions regarding the existence of speech and language disorder when testing a child in Arabic are highly dependent on subjective measure. Further studies on Arabic language development can contribute to the development of an assessment tool to examine children's speech and language development in Arabic in order to enable a valid identification of children with language disorders. Furthermore, a linguistic understanding of the production of Arabic structures can be utilized in SLP treatment of children with syntactic deficits (Levy & Friedmann 2009).

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**2nd proofs**