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TOWARDS A MORPHOLOGICAL THEORY: THE CASE OF ARABIC BROKEN AND SOUND PLURALS

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Abstract: the paper discusses the Arabic broken plural and sound plural (SP henceforth) as two instances of two distinct morphological processes involving different characteristics and mechanisms. I propose an analysis based on how morphology operates in the lexicon and the syntax and provide data from Arabic and Hebrew. I argue that the BP is derived lexically as one atomic complex word while the SP involves a two-unit merger deriving a non-atomic word in the syntax. Evidence follows from the lexical access, morphological productivity, semantic distinctions of number and the lexical representation of BP and SP. Atomicity plays a crucial role in the distinction of morphology in the lexicon and the syntax not just in Arabic morphology but also cross-linguistically as illustrated by the Hebrew diminutives which add further evidence to the effect of atomicity in the morphological analysis of words.

Introduction

Where is morphology? This is a basic question that has concerned linguists for a long time, and it is still a field of rigorous debate. Is morphology performed at the Lexicon or the syntax? Despite the huge literature on the topic, no satisfactory answer is provided to show that morphology is conclusively part of the lexicon or the syntax. There are the lexicalists - such as Selkirk (1982), Di Sciullo (1987) to name a few- who assume that morphology is part of the lexicon with no interaction whatsoever with the syntax. There are other linguists, on the other hand, like Baker (1988a, 1996), who argue that morphology is controlled by the syntax and is therefore constrained by syntactic principles.

In order to resolve these asymmetrical and oftentimes contradictory approaches, it is necessary to determine what part of word formation is controlled by the lexicon and what part may be reduced to the syntax. This line of thinking stems from the assumption that both the lexicon and the syntax equally contribute to morphology (cf. Anderson 1982, 1992). However the morphology interaction with the lexicon and syntax remains open to discussion since the morphological boundaries between the two levels are not settled.

The purpose of this paper is to provide a theory that determines the lexical and the syntactic nature of a morphologically complex word. Studying the morphological structure of the Arabic BP and the SP, I examine how the two structures relate to the lexicon and the syntax and the implications of that for the morphology-syntax interface.

The paper is organized as follows. The first section provides a brief background of BP and SP and the traditional Arab grammarian analysis. In the second section, the more recent generative analyses are covered and criticized. McCarthy (1993, 1995) and McCarthy and Prince (1993) are briefly explained. Furthermore Ratcliffe (1996, 2003) and Zabbal are introduced. The third section illustrates the theoretical framework of the paper. I introduce the Lexicon-Syntax Hypothesis (LSH henceforth) as an analysis that exactly determines the boundaries between the lexicon and the syntax in a morphologically complex structure. Section four gives different pieces of support for LSH based on: lexical access, morphological productivity, semantic distinctions of number, and the syntactic and the phonological representation of BP and SP. The fifth section tests the LSH by examining the diminutive structures in Hebrew. Finally, a conclusion summarizes the main points of the paper.

I will use the following abbreviations: BP=broken plural, SP=sound plural, LSH=lexicon-syntax hypothesis, nom=nominative case, acc=accusative case, sg=singular, pl=plural, 3=third person,

perf=perfective, masc=masculine, PART=particle, fem=feminine, num=number, D=determiner, DP=determiner phrase, LH=lexical hypothesis.

As for the phonetic symbols, I will transliterate the Arabic data using the international Phonetic symbols (IPA). Below is a list of the possible symbols:

THE INTERNATIONAL PHONETIC ALPHABET (revised to 2005)

CONSONANTS (PULMONIC) © 2005 IPA

	Bilabial	Labiodental	Dental	Alveolar	Postalveolar	Retroflex	Palatal	Velar	Uvular	Pharyngeal	Glottal
Plosive	p b			t d		ʈ ɖ	c ɟ	k g	q ɢ		ʔ
Nasal	m	ɱ		n		ɳ	ɲ	ŋ	ɴ		
Trill	ʙ			r					ʀ		
Tap or Flap		ⱱ		ɾ		ɽ					
Fricative	ɸ β	f v	θ ð	s z	ʃ ʒ	ʂ ʐ	ç ʝ	x ɣ	χ ʁ	ħ ʕ	h ɦ
Lateral fricative				ɬ ɮ							
Approximant		ʋ		ɹ		ɻ	j	ɰ			
Lateral approximant				l		ɭ	ʎ	ʟ			

Where symbols appear in pairs, the one to the right represents a voiced consonant. Shaded areas denote articulations judged impossible.

1.Arabic BP and SP

In this section, I introduce a brief background of the morphological structure of BP and SP and the traditional Arab Grammarians' analysis of these structures.

BP

Early Arab grammarians considered this type of plural *broken* since its morphological structure differs from the structure of the singular form as if the plural form breaks the morphological structure of the singular noun (Ibn asSarraaj 1988, vol. 2: 429). The broken plural formation involves an irregular morphological process whereby the stem unpredictably undergoes an internal stem change (Ratcliffe 1990: 102). BP has different types: the paucity plural, the multiplicity plural, and the ultimate plural beside some other types that will be discussed shortly.

The Paucity Plural

The paucity plural refers to a group of individuals or things from three to ten. This plural type has four forms or patterns: [1]

	Pattern	Example
(1)	a. af ul[2]	ba ar → ab ur 'seas'
	b. af aal[3]	waqt → awqaat 'times'
	c. af ilat[4]	imaar → a mirat 'donkeys'
	d. fi lat	fata → fityat 'boys'

As in all types of broken plural, most paucity plurals can be regular or irregular.[5] For example, *af ul*

[1] See, among others, Ibn Hishaam (1979) and Ibn aqiil (1985).

[2] According to Wright (1971) /fa ul/ metathesizes to *af ul*. Metathesis is a phonological process that changes the order of the sequence of sounds, e.g. *ba ur* changes to *ab ur* due to the introduction of the glottal stop . For more details, see Wright (1971).

[3] As Wright (1971) indicates, /fa aal/ metathesizes to *af aal*.

[4] /fa il/ metathesizes to *af il-at* as suggested by Wright (1971).

[5] I will not discuss the conditions of every regular and irregular form of the broken plural since this will consume much space and will not bear direct relevance to the basic discussion of the paper. I mean by the *regular* application of a plural form the grammatical conditions that were prescribed in the Arabic Grammar literature for a specific plural form, see, for example, Hassan (no date, vol. 4, pp. 633). These conditions vary from one form to another. For specific details, however, check the classical Arab grammarian literature.

applies regularly to a singular *fa l* noun, not an adjective, and isn't filled by a semivowel[6] like *w, j* while *f* isn't filled by *w* as in *waqt* which doesn't take *af ul* as a result.[7] *af ul* applies also productively to a singular feminine quadrilateral noun with no overt feminine morphological marker and its penultimate sound should be a long vowel as in *iraa* 'arm'.[8] *af ul* applies irregularly to *uraab* 'crow' forming the broken plural *a rub* (al alawaani, 1987: 254). Among all paucity forms, *fi lat* is only irregular and has limited occurrences[9].

The Multiplicity Plural

This type of plural refers to a group of individuals or things from three to more than ten. There is disagreement among Arab grammarians with regard to the exact number specification of the multiplicity plural. The majority of grammarians assume that this plural refers to more than ten like Ibn aqiil (1985, vol. 4: 114), asSyuutii[10], Ibn Hishaam[11], and *al alawaani* [12] to name a few. However some others believe that the multiplicity plural exceeds three to an infinite number[13]. This type has twenty-three patterns. Here are some examples[14]:

	Pattern	Example
(2) a.	fu l a amar	→ umr 'plural of the red color'
b.	fu ul kitaab	→ kutub 'books'
c.	fu al rukbah	→ rukab 'knees'
d.	fi al ma idah	→ mi ad 'stomachs'
e.	fu aala qaad	→ qud aat 'judges'
f.	fa alat kaatib	→ katabah 'witers'
g.	fa laa sakraan	→ sakraa 'drunk'
h.	fi alat qird	→ qiradah 'monkeys'
i.	fu al saajid	→ sujjad 'worshippers kneeling down in a prayer'
j.	fu aal kaafir	→ kuffaar 'disbelievers'
k.	fi aa jabal	→ jibaal 'mountains'
l.	fu uul asad	→ usuud 'lions'
m.	fu laan jidaar	→ judraan 'walls'
n.	fi laan ulaam	→ ilmaan 'boys'

The Ultimate Plural

This kind of plural is considered to be ultimate plural since it cannot be further pluralized.[15] There are seven forms of this type of plural (al alawaani 1987: 272-280):

	Pattern	Example
(3) a.	fawaa il	xaatam → xawaatim 'finger rings'
b.	fawaa iil	jamuus → jawamiis 'buffalos'
c.	fa aa il	abii ah → abaa i 'slaughtered animals'
d.	fa aalii	s a raa → s a aarii 'deserts'
e.	fa aalil	aqrab → aqaarib 'scorpions'
f.	fa aaliil	sult aan → salaat iin 'sultans'
g.	fa aaliiy	kursiiy → karaasiiy 'chairs'

In the reminder of this section, we point out to two plural types that are somehow different from the previous broken plural kinds.

The Plural Noun

This type refers to more than two and has no singular of the same morphological form. For instance, *qawm* or *jamaa ah* 'group of people' has no equivalent morphological singular form, but it has different morphological singular forms: *rajul* 'a man' or *imra ah* 'woman'. Nonetheless some plural nouns may have singular forms of the same morphological form but they have no fixed pattern of any of the broken plural patterns mentioned above. For example, the plural of *s aa ib* 'companion' is *s a b* which is

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[6] I would like to thank Dr. Musaed Bin-Muqbil for his insightful discussion on semivowels.

[7] See Hassan (no date).

[8] See al alawaani (1987, pp. 254); see also Hassan (no date, vol. 4, pp.636-637).

[9] See al alawaani (1987. pp. 258) and Hassan (no date, vol. 4, pp.639-640).

[10] See asSyuutii (no date, vol.3, pp. 348).

[11] See Ibn Hishaam (1979, vol. 4, pp. 307).

[12] See al alawaani (1987, pp. 250).

[13] See Hassan (no date, vol. 4, pp.627).

[14] For more details on all the paucity plural forms, see al alawaani (1987, pp. 258-270) and Hassan (no date, vol. 4, pp. 641-670).

[15] For example, *jamuus* 'buffalo' has the ultimate plural *jawamiis* and it hence cannot be further pluralized unlike the case of other plurals like *kilaab* 'dogs' that can have a plural of plural form *aklub*. See Hassan (no date, vol. 4, pp. 213).

not an attested pattern of broken plural.[16] As a result, such plural is not considered to be a broken plural but a plural noun for an independent reason which is copular agreement. To illustrate, let us consider the following example[17]:

(4) as s a bu musaafirun
The group of companions-nom-sg travelling-nom-sg
The group of companions is travelling.

The comment *musaafirun* is singular and it agrees with its subject *as s a bu* in number indicating that it is singular and not plural, even though it has a plural meaning.

The Collective Noun

It is a plural type which shares with its singular form the same morphological base. However the singular form is distinguished with an addition of either a suffix *-at* for making feminine or *-iiy* for marking the relational adjective (i.e., Nisba). For example, *tamr* 'dates' has the singular *tamaratun* 'one piece of dates'. The marker *-at* indicates the singular feminine. Another example is *Turk* 'Turkish people' has a relational adjective *Turkiiyyun* 'Turkish'. Therefore this plural refers to the category of the noun which is associated mentally with an abstract set of properties distinguishing them from another category (Hassan, no date, vol.1: 21-25 and 288-290). More specifically, *ajar* 'trees' is associated with idealized set of characteristics (e.g., trunk, leaves, root…) that distinguish this category from another different category like *ba uud* 'mosquitoes'. Arab grammarians disagreed on whether to consider the categorical noun a broken plural since it is conceived as an integral unit with discrete parts. However it is used as a plural because it predominantly refers to three or more as pointed out by (Hassan, no date, vol.: 123-24).[18]

SP

Arab grammarians viewed this plural formation process as sound since the morphological form of the singular is left intact with no change unlike the case of BP (Hassan, no date, vol. 1: 137). SP productively involves an addition of a suffix to the singular form at the external stem boundary (Ratcliffe 1990: 94-103). Number distinguishes SP into two types: dual and plural. Dual is marked by the affix *-aan* for the nominative and *-iin* for the accusative and genitive. Plural refers to a group of people exceeding two and it is marked by

-uun for the nominative and *-ii-* for the accusative and genitive. Below are examples of SP:

	singular	dual
	plural	
(5)	mudarris 'teacher, male'	mudarrisaan
	mudarrisuun	
	mudarrisah 'teacher, female'	mudarrisataan
	mudarrisaat	

2. **The Recent Generative Analyses of BP and SP**

There are three generative approaches that attempted to examine the structure of BP and SP and came up with theoretical analyses. I explain in this section McCarthy and Prince's proposal in (1990), McCarthy (1993) and (1995). Then I illustrate Ratcliffe's analysis (1990), (1997), and (2003). Finally I discuss Zabbal's approach (2002). I address the problems of these analyses that make them inadequate to account for the data.

2.1**McCarthy and Prince (1990b)**

McCarthy and Prince (1990b) propose a theory relating phonology to morphology in order to explain how a word formation process applies in Arabic BP. More specifically, they establish a close link between templates[19] and prosodic structure (cf. also McCarthy 1993 and 1995). In other words, a complex morphological process like BP may be better explained, according to McCarthy and Prince, by mapping an iambic foot to the singular form base. McCarthy and Prince develop a theory of Prosodic Morphology which has three basic components (McCarthy and Prince, 1990b: 1):

Prosodic Morphology Hypothesis. Templates are defined in terms of the authentic units of prosody:

[16] See Hassan (no date, vol. 4, pp. 680-681) and al alawaani (1987, pp. 280-281).

[17] See Hassan (no date, vol. 4, pp. 681).

[18] I will not discuss any further the collective and the plural nouns nor the plurality distinctions between these plural types and the other default broken plurals since this goes beyond the scope of the paper and it does not affect my basic analysis.

[19] Templates are fixed shapes of morphological structures. For details, see McCarthy (1993).

mora (μ), syllable (σ), foot (F), prosodic word (W), and so on.

Template Satisfaction Condition. Satisfaction of templatic constraints is obligatory and is determined by the principles of prosody, both universal and language-specific.

Prosodic circumscription of Domains. The domain to which morphological operations apply may be circumscribed by prosodic criteria as well as by the more familiar morphological ones. In particular, the **minimal word** within a domain may be selected as the locus of morphological transformation in lieu of the whole domain.

McCarthy and Prince (1990b: 211, 212) differentiate between BP and SP in that the latter is more productive and involve suffixation and that it represents a marginal mode of pluralization compared to BP.

They analyze the different patterns of Arabic BP based on Wright (1970).[20] Wright divides the patterns of BP into four basic categories: iambic,[21] trochaic,[22] monosyllabic,[23] and others.[24] Of all these BP types, McCarthy and Prince only focus on the iambic type since they consider it the most productive type. Their analysis is to circumscribe the first two moras of singular noun as a result of the minimal word condition. Then to form the plural, the circumscribed part of the word is mapped to an iambic foot.

Let us consider the following examples (McCarthy and Prince, 1990b: 221):

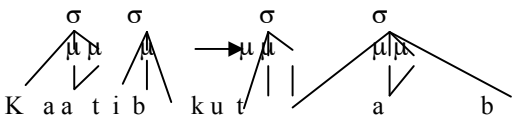
(6)[nafs] [sultaan] [jundub]
naf sul jun circumscribe a minimal word
nafaa suluu junuu map to iambic template
nufuus salaat iin janaadib restore residue and change vowels

As we observe in (6) McCarthy and Prince's analysis of BP accesses a bimoraic word and then maps it into an iambic foot, which is CvCvv. Then the vowel melody is changed and the residue of the word is restored. McCarthy argues that Arabic has the following 'canonical noun patterns'[25] that are able to from the broken plural (McCarthy 1993, ex. 20: 10):

(7)a. H b. LL c. LH d. HL e. HH f. HL g. HH
CvCC CvCvC CvCvvC CvvCvC CvvCvvC CvCCvC CvCCvvC
ba r badal waziir kaatib jaamuus xanjar jumhuur.

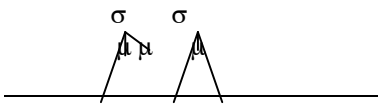
According to McCarthy, these patterns are canonically the basic the noun patterns of Arabic being able to derive a broken plural with the exception of (7e) which he assumes to be rare and "probably an historical innovation" (1993, ex. 20: 10). McCarthy regards the patterns (7a, b, c, and g) as the basic iambic types of Arabic. These templates are authentic prosodic units formed in the lexicon and used by the morphology. On the other hand, the patterns (7d and f) are "non-iambic'' and are not basic templates themselves but they are integrated in a template through either a mora affixation or a-templatic prosodic morphology (1993: 11). To illustrate, the pattern CvvCvC derives a broken plural via the affixation of the mora as illustrated by (8).

(8) singular broken plural



In (8), the singular is formed by extending the mora of the vowel to form a long vowel. As a result a HL anti-iambic foot is derived. The broken plural is anti-iambic foot too and is formed by linking the second mora of the first syllable to *t*.[26] This mora was occupied by the second member of the long vowel *aa* in the singular form. Moreover the vowel is lengthened in the broken plural by multiply linking *a* to two moras. As for CvCCvC, it is only restricted to nouns with four consonantal roots as illustrated by (9):

(9) singular



[20] For details, see McCarthy and Prince (1990).

[21] An iambic pattern is a foot consisting of two syllables which can be: light-heavy, light-light, or heavy.

[22] A trochaic pattern is a foot consisting of two syllables which can be: heavy or light-light.

[23] This type is restricted to a monosyllabic BP pattern *CuCC* involving adjectives of color and bodily defect as in *umr* 'red'. See McCarthy and Prince (1990, pp. 214, 215).

[24] This is represented by the BP type *CuCCaaC* as in *kuffaar* 'infidels'. It is derived from the active participle *kaafir*. It is discussed below.

[25] Final consonants in these patterns are extrametrical; thus they do not count in syllable weight.

[26] See McCarthy (1993, footnote 8).

| | |
x a n j a r

According to McCarthy, this pattern is not an authentic template but an anti-iambic foot since it consists of four consonants with no "templatic constraint on the form" and is derived by "a-templatic" prosodic morphology. [27]

McCarthy's analysis of Arabic morphology is influential and effective. McCarthy's basic assumption is that the plural is derived from the singular that combines the root and the template. This supports the analysis that I propose in the next section. However the circumscription of the broken plural to an iambic foot is nonetheless problematic. Given the unpredictability of the BP, the iambic analysis is incapable of accounting for the different types of Arabic BP. Such analysis works for Arabic ultimate plurals like those in (6) in which an iambic CvCvv can be circumscribed, but not for others like paucity, multiplicity, collective noun, and so on as illustrated by (10):

(10) imaar 'donkey' sariir 'bed'
im sar
circumscribe a minimal word
imaa saraa map to iambic template
a maa ------ *a*-metathesis
* a maarat *saraaiir restore residue

If we apply the iambic plural rule to the nouns in (10), we end up with ungrammatical broken plurals. The BP of theses forms are *a mirat* and *surur*. They are both trochaic broken plurals of the paucity *af ilat* pattern and the multiplicity *fu ul* pattern. McCarthy justifies that the trochaic patterns are of less generality and productivity (McCarthy and Prince 1990b, pp. 215 and 278). Hence the iambic rule does not apply to them. However if we aim at providing an analysis to the BP phenomenon, it is essential that all types are taken into consideration. Another problem deals with the "anti-iambic'' noun patterns that we discuss in the next section. Because of these problems as well as some other pieces of evidence I provide in section 4, the lexical analysis might be the only workable account for BP.

Ratcliffe (1990, 1997, 2003)

Even though Ratcliffe assumes that BP and SP are two different kinds of morphological processes involving two different functions, he, nevertheless, argues that both are formed in the lexicon. Ratcliffe adopts Siegel's distinction (1974) between inflectional and derivational morphemes. Ratcliffe agrees with Siegel in associating inflectional and derivational morphemes with class I and class II respectively. Class II affixation involves inflections that are syntactically relevant while derivations belong to class I which are irrelevant to syntax. Ratcliffe believes that inflections and derivations employ the same formal rules of word formation and the same formal mechanisms. Thus he thinks it is redundant to assume that inflections and derivations are formed at the lexicon and the syntax. In order to eliminate such redundancy, he argues that *all* morphological processes are derived in the lexicon while the syntax has no role to play (Ratcliffe 1990, pp. 96). This extreme position is reminiscent of the old strong lexicalist hypothesis that was proven to be missing an important generalization that the syntactic principles may not be completely eliminated from forming a morphologically complex word. Baker's influential work (1988a) has robustly illustrated that incorporation in Mohawk is controlled by the syntactic principle ECP. Therefore, Ratcliffe's claim cannot be maintained. In the third section, I specifically argue that it is important to derive BP and SP in the lexicon and the syntax respectively since they use irreconcilable different rules of word formation and different sets of mechanisms. If word formation rules apply at two different points in the grammar[28], then such redundancy becomes an integral

[27] See McCarthy (1993, pp. 15).

[28] The influence of the lexicon and the syntax in morphology is independently evidenced in the works of the lexicalist tradition (Di Sciullo and Williams 1987; Lieber 1992 among others) and in the works of Baker (1988a, 1996). Li (2005) integrates a comprehensive theory of morphology that redundantly combines both lexical and syntactic approaches based on empirical data drawn from different languages.

part of the morphological system that cannot be eliminated[29].

Ratcliffe criticizes McCarthy's claim that only the canonical noun patterns in (7) form a broken plural since there are other patterns as well.[30] For instance, a CvCCvCvvC pattern form as *ankabuut* derives *anaakib*. He also takes issue with McCarthy's non-iambic patterns. McCarthy proposes that pattern CvvCvC (e.g., *kaatib*) and CvCCvC (e.g., *xanjar*) are not canonical noun templates and hence they have to produce a BP via mora suffixation and a-templatic prosodic morphology respectively. The fact that these patterns can develop a BP suggests that McCarthy's noun canonicity is empirically false.[31] Ratcliffe observes that these patterns have lexicalized BP.[32]

In order to solve the problems of McCarthy's analysis, Ratcliffe (1990: 108) suggests a "Long Vowel Pluralization Rule" which derives a BP by inserting a -VV- segment after the second C in the prosodic template. This rule handles McCarthy's iambic and "anti-iambic" patterns:

(11) Pattern Singular N BP

a. CvCC nafs nufuus
b. CvvCvC kaatib kuttaab
c. CvCCvC xanjar xanaajir

As the examples in (11) show, the vowel is lengthened after the second consonant. However this rule partially applies to some broken plurals and is by no means comprehensive. To illustrate, the rule cannot handle the non-iambic patterns of BP like for example the trochaic patterns such as *qiradat*. Another example of the trochaic pattern is *fu alaa* where Ratcliffe's long vowel rule does not apply. He stipulates that when we there are rational entities such as *wuzaraa* 'ministers', the vowel after the third consonant is lengthened (1990, pp. 109). However this condition is completely ad hoc and cannot be justified. Moreover there are non-rational entities resisting Ratcliffe's rule as the BP *xus abaa* 'fertile', *ulamaa* 'painful'. There is also BP *ans ibaa* 'shares'[33] which is problematic to the long vowel rule. These examples involve a trochaic pattern in which the long vowel is after the third and the second consonant involving irrational entities unlike what Ratcliffe assumes. Finally the long vowel rule does not apply in monosyllabic *CuCC* pattern of the BP as in *umr* 'red'. As a consequence of these counterexamples, Ratcliffe's rule cannot be maintained since it cannot account for the BP patterns as a whole.

Zabbal (2002)

Zabbal argues that the asymmetry in the syntax and the morphology of BP and SP stems from a functional category *Num*. He follows Ritter (1992) in assuming that Num is a functionnal category in which the number feature is checked via the movement of the head noun in syntax. One piece of evidence that Ritter provides to support Num is that the number and the numeral adjective in Hungarian NPs are in complementary distribution. Let us consider the following example (Ritter 1992: 215):

(12) a. A gyerekek szeretik egymást
the children love+3pl each other
'The children love each other'
b. A két gyerek szereti egymást
the two child love+3sg each other

[29] Ratcliffe (1990) assumes it is redundant to apply morphology at the lexicon and the syntax. Hence in order to reduce the redundancy he argues that morphology is only applicable at the lexicon. But language, just like other biological systems, abounds with redundancies. Redundancy in biology refers to biological components fulfilling completely or partially the same function. For example, human beings have two kidneys when one is enough to do the job. Such biological redundancies may result from "backup" mechanisms. The linguistic theory seeks to provide an optimal explanation for the data. Reducing redundancies is essential to achieve an explanatory adequacy for the linguistic phenomena, but such redundancies may not be totally removed. See Li (1997) for details.

[30] Ratcliffe (2003, pp. 239).

[31] Ratcliffe (2003, pp. 239).

[32] Ratcliffe (2003, pp. 239) points out that CvvCvC pattern produces sound plural as *kaatibuun* and a broken plural *kuttab*. He does not however explain why this form redundantly takes two different types of plural. I explain in later sections that the analysis I am proposing provides an explanation.

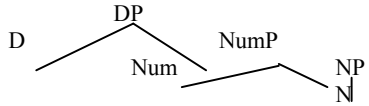
[33] The last three examples are taken from al alawaani (1987, pp. 270, 271).

'The two children love each other'

c. A öt gyerek körülvesz-I a kisbabá-t
the five child surround+3sg the baby-ACC
'The five children surround the baby'

The noun moves to Num to check plural number as in (12a). However when there is a numeral adjective, it occupies the Num position preventing the noun from moving into Num as in (12b, c). Zabbal argues that Num is part of the BP and SP structure which are DPs, following Abney (1987). The basic structure of BP and SP appears in (13):

(13)



The D position is filled by a determiner while number is placed under Num. The case for SP is straightforward, i.e. the dual and plural morphemes are placed under Num and the head noun, e.g. *muddarris* 'teacher', moves syntactically to Num to check the number features. Hence the dual *muddarrisaan*, or *muddarrisaat*, or *muddarrisuun* is produced. Zabbal assumes following Wright (1971) that the semantics of SP transparently refers to a set of individuals or things. As for BP, Zabbal distinguishes also two types: distributive and group BP. Distributive BP is similar to SP semantically and syntactically. Semantically, the BP *t t ullab* 'the students' involves a set of individuals or things. Syntactically, the head noun, according to Zabbal, moves to Num to check the plural number and hence the plural morpheme shows up in the verb as in this example from Arabic Lebanese (Zabbal 2002: 57, ex. 5a):

(14) inna T-Tullaab katab-**uu** maqaal

PART the-student pl write.perf-3.mascu pl article

'The students [each] wrote an article'

The group BP on the other hand refers to a group participating in performing a single action, i.e. writing an article (Zabbal 2002: 57, ex. 5b):

(15) inna T-Tullaab katab-**a** maqaal

PART the-student pl write.perf-3-fem.sg article

'The students wrote an article [together].

The students all participated in writing an essay; hence the PB is singular and triggers a singular feminine agreement on the verb. Zabbal argues that group BP is derived in the lower NP and therefore does not move to Num. In other words, the group BP is derivational while the distributive BP as well as SP is inflectional involving movement to Num.

Zabbal's analysis attempts to distinguish BP and SP. However such distinction cannot be maintained since the distributive vs. group criteria may not be exclusively limited to BP. SP may equally have distributive and group meaning:

(16) az-Zahraat-u abl-an/ abal-at.

The-flowers-nom withered-3.fem.pl / withered-3.fem.sg

The flowers withered.

Zabbal's analysis of distributive and group BP can be extended to SP *azZahraatu*; hence two types of SP exist: a distributive SP (i.e., a set of flowers) in which the noun move to Num to check the feminine plural. A group SP (i.e., a group of flowers) in which no movement to Num is allowed and the noun is derived instead in the lower NP (in a structure like (13). But if no movement is possible, how is the noun going to check the

-aa- in Num according to Zabbal's analysis? The analysis cannot solve this dilemma without being radically changed. Thus it might be necessary however not to confuse the morphological and syntactic properties of BP and SP with the agreement they trigger on the verb. To illustrate, BP and SP may be simply treated as collective nouns that might be considered as singular or plural as the examples in (14-16).[34]

It is essential nonetheless to contrast BP and SP based on their asymmetric morphology and syntax. Zabbal (2002: 65-68) provides interesting data related to secondary plural morphemes. For example, the BP *jimaal* 'camels' may have secondary plural morphemes deriving a dual BP *jimaalaan* 'two groups of camels' and a feminine sound BP *jimaalaat*. As pointed out by Zabbal, the dual and

[34] Deciding between distributive and group reading may be determined by pragmatics. I am not going to discuss this issue any further and I leave it for future research.

feminine morphemes are placed under Num while the BP is derived in the lower NP. If the BP is to be derived at Num, then the sound plural morphemes will not be formed. This gives strong evidence that BP is derived below Num while SP at Num. We provide further distinctions between BP and SP in section 4. What is crucial then in the distinction between BP and SP may after all lie within the derivational versus the inflectional account that any analysis should address. There are differences between inflections and derivations to which SP and BP subscribe.[35] For example closeness of the root is a key derivational property that BP abides by while an inflectional morpheme in SP tends to be at the periphery as in *jimaal**aat***. Moreover productivity is another important aspect differentiating BP and SP.[36] We provide further discussion of these aspects below. Zabbal's analysis blurs such distinctions and may even implicate that BP and SP may be treated equally morphologically and syntactically.

3. **The Theoretical Framework**

In this section, I provide a morphological analysis for BP and SP. The Lexicon-Syntax Hypothesis (LSH) regulates the morphological processes exercised at the lexicon and syntax:

(17) Morphology operates at the lexicon and the syntax:

a. Morphology derives lexically an atomic word structure that is not affected by syntactic principles.

b. Syntax derives a functional word, non-atomic, from a merger of two linearly adjacent morphemes: a (functional) head and non-head.

The LSH in (17) is condensed and needs a detailed explanation. To begin with, (17) combines a lexical part and a syntactic part. The lexicalists like Williams and Di Sciullo (1987) among others, would only advocate the lexical part and eliminate syntax all together from affecting morphological structure, whereas proponents of the syntactic camp, such as Baker (1988), would argue that syntactic principles control the formation of morphologically complex words. Both camps provide empirical evidence proving their lexical and syntactic claims that cannot be eliminated by the other. It becomes then a necessity to provide an explanatory theory of the lexicon-syntax interface with morphology. In order to explain how LSH works, let us examine how the two basic parts of (17) work:

3.1Morphology in the lexicon

(17a) is derived from the Lexicalist Hypothesis (LH). Chomsky (1970) argues persuasively against the transformational analysis of words put forth by the Generative Semanticists.[37] Chomsky proposes that even though some words are syntactically derived through transformations[38] (as in gerundive nominals like *criticizing*) not all words are syntactically derived since there are words such as derived nominals (e.g. *criticism*) that are lexically formed. Chomsky (1970) is essential in many respects: one of them is that it succeeded in abolishing the Generative Semanticists' transformational theory because the syntactic analysis alone cannot account for word formation. Another important outcome is that Chomsky's work paved the way for LH and the lexical analysis began to take shape ever since. Di Sciullo and Williams (1987) and Di Sciullo (1996) establish a lexical base for the analysis of a word. I draw my lexical analysis from these works. Morphology in the lexicon is characterized with a set of conditions and mechanisms that I discuss below.A word is a morphologically complex atomic structure. Atomicity

[35] Even though the criteria used to distinguish inflections and derivation cross-linguistically is not clear-cut, such criteria at least in Arabic tends to show that there are at least some differences that have to be taken seriously.

[36] I mean by productivity rule-governability. For example, the SP, unlike BP, can be derived a very general and productive rule of applying the sound plural morpheme at the periphery of the singular noun. See section 4.3 for more details.

[37] For details, see McCawley, J. (1968).

[38] The Generative Semanticists assume that words with similar meaning are transformationally derived. For example, *open* is derived from *closed* through predicate raising. That is, *open* underlyingly consists of four successive predicates: *cause, become, not, closed. Closed* raises to *not* and *not closed* raises to *become* and *become not closed* raises to *cause* and a lexical insertion rule replaces the predicates with *open*.

is a crucial property that distinguishes a structure formed in the lexicon from another structure formed in the syntax, e.g. a phrase. While the phrase internal parts may be accessed by the syntactic rules (i.e., merger, movement), the internal structure of a word is sealed off from the syntax (Di Sciullo and Williams (1987). Before we explain in some details atomicity, let us now explain the basic characteristics of the lexicon. Words or X° expressions are formed in the lexicon. The lexicon may be thought of as a Morphological Form (MF) at which a word is derived (Di Sciullo 1996: 22-23).[39] There are two basic conditions of the MF: Full Interpretation (FI) and the Uniformity of Chains Condition (UCC).[40] FI specifies that a word structure must consist of legitimate objects or components: a head and an adjunct which together form an X° expression. The head projects its features by a rule called COMBINE while an adjunct or the non-head identifies a feature of the head by rule called LINK. In other words, the rules of COMBINE and LINK ensure that the head and non-head parts work harmoniously in establishing a set of features for the complex word structure as the following structure illustrates:

(18) X (F1, $F2_i$)

Y ($F2_i$) X (F1)

(18) represents a word structure in which X is the head since it determines the lexical category of the word. The head, e.g. the lower X, project its feature to the higher X, the morphological complex word. The feature of Y is linked to the features of the higher X through coindexation. The feature of Y (i.e. F2) has the same index as F2 of the higher X. Y forms a uniform chain[41] with the word structure status since Y is linked to the feature of word structure as a whole thus fulfilling UCC. The word ends up having a head-adjunct structure as in (18) and interestingly the word or X° expression can have a structure of a phrase as in the case of deadjectival causatives or denominal causatives[42] in which these verbs are associated with specifiers and complements like a phrase. However the word, despite its relatedness to phrases, behaves syntactically as a head-adjunct structure and the syntax cannot access its internal parts because the word is opaque.[43]

I argue that Arabic BP is morphologically derived in the lexicon. Below I provide some evidence and present more in the next section. The structure of a BP *rijaal* 'men' appears in (19):

(19) N (pl, $masc_i$)

/rjl/($masc_i$) N(pl)

CVCVVC

The noun pattern CVCVVC merges with the consonantal root /*rjl*/ to form a morphologically complex word. Such analysis is supported by established research in the literature. For instance, Fassi Fehri argues that BP is made up of a consonantal root that merges lexically with another root (e.g. plural template). This explains why the plural of BP has different vowels from its singular.[44] McCarthy (1979a) observes that morphological system of Semitic languages is nonconcatenative and is therefore easily explained if the consonant root is associated to a CV template. Ratcliffe emphasizes that the consonant root merges with the CV pattern to

[39] MF as Di Sciullo (1996, pp. 22) explains is the interface between word structure and the performance systems, i.e. the speech and the thought systems.

[40] See Di Sciullo (1996, pp. 23-25) for more details.

[41] Di Sciullo (1996, pp. 23-25) adopts the conditions of FI and UCC proposed by Chomsky (1994, 1995) for XP expressions. Chomsky uses FI to ensure that every item at the Logical Form be a head, an argument, a modifier, or a variable. As for UCC, Chomsky uses it for the derivation of XP during movement in syntax in which a chain (i.e. head and tail of the moved element) must be uniform with regard to phrase structure status. Di Sciullo extends FI and UCC conditions to the derivation of X° expressions at Morphological Form (MF), the level at which a word is formed.

[42] Deadjectival verbs and denominal verbs in Arabic as well as Hebrew are morphologically complex words that are derived lexically as X°. For details on these structures, see Al-Dobaian (2002). See also Al-Dobaian (2005, pp. 65-83).

[43] See Di Sciullo (1996, pp. 22) for details.

[44] See Fassi Fehri (1993, pp. 82 and 86 n10).

derive a morphologically complex word. He argues that the consonant root is not a morpheme since it does not show up phonetically but it shows up as an abstract form in an intermediate level during a derivation.[45] In Hebrew, Arad (2003: 741) observes that the merger of the root and the pattern is produced to achieve two basic functions. First, the root alone cannot be realized phonologically; thus it needs to merge with a pattern in order to be pronounceable. Secondly, the merger serves to turn the root into a category (i.e. a noun, an adjective, a verb…). Arad observes that the root in Hebrew is associated with multiple meanings and it is only through the merger of the root with the template that the word gets its interpretation.[46] She adopts Marantz's Locality constraint (2000) stating that "roots are assigned an interpretation in the environment of the first category-assigning head with which they are merged. "Once this interpretation is assigned, it is carried along throughout the derivation". (Arad 2006, pp. 747). In other words, the interpretation of the root is locally determined by the template, the first category-assigning head that merges with the root thus providing the word with interpretation, hence accounting for the varied meanings of the *qlt* forms in footnote (46). Therefore this merger produces a local or closed (atomic) domain. Arad assumes that such locality can be stated as a condition in the lexical component governing complex words (Arad 2006: 748).

Based on this accumulating literature, a BP as *rijaal* is lexically formed as one complex word by merging a consonantal root into the pattern CVCVVC. We can extend Arad's root analysis not only to Arabic but may be to all Semitic languages since they show the same morphological system. *rijaal* is a plural noun distinguished from *rajul* 'man' in number and the plurality is determined by the pattern CVCVVC. Therefore the pattern is the head of the word while the root specifies the gender of the word as the diagram in (19) shows.[47] The morphologically complex structure in (19) respects the conditions of MF. First it satisfies FI since the head projects its plural feature to the higher N by the rule COMBINE. Secondly the non-head consonantal root feature fulfills the UCC since its feature (i.e. masculinity) is related by the rule LINK to the feature of the higher N; hence the consonant root forms a uniform chain with regard to the word structure status. The word internal components in (19) are atomic behaving as an opaque complex morphological unit.

3.2Morphology in the syntax

Even though the lexicon has an important role in deriving morphologically complex words, the lexicalist analysis cannot preclude syntax from affecting word formation process. Marantz (1984) observes that verbs merge to the causative affix in syntax in Chimwi:ni. He based his syntactic analysis on binding and passivization. Furthermore, Baker (1988a) has shown data from Mohawk where morphologically complex words are formed through movement of a head to incorporate to another head in syntax. Baker argues that such incorporation is syntactic since it is controlled by ECP. He illustrates that only direct object may be moved while the subject cannot move. This subject/object asymmetry is a clear diagnostic of ECP. The data of Marantz and Baker cannot be explained lexically.While the lexicon is responsible for deriving complex lexical categories like nouns, verbs and so on as (17a) suggests, syntax on the other hand forms functional words/ categories as (17b) indicates. To illustrate, functional categories are categories that serve a grammatical function. It is commonly assumed that functional projections are only formed in syntax and not in the lexicon and that they are represented

[45] See Ratcliffe (2003, pp. 216-220).

[46] For instance, Arad (2006, pp. 744 examples in (9)) illustrates that the root *qlt* has a wide range of meanings. She includes among other forms of *qlt*: *qalat* (v) 'absorb, receive', *miqlat* (n) 'a shelter', *miqlet* (n) 'a receiver', *taqlet* (n) 'a record'. These forms are respectively associated with cvcac, miccvc, miccec.

[47] As in Hebrew, the consonant root in Arabic is associated with many meanings. For instance, the root *qtl* can have different forms associated with different meaning. Some forms include: *qitaal* cvcvvc (n)'a battle', *qaatil* cvvcvc (n) 'a killer', *muqaatil* mucvvcvc 'a fighter', *qatlaa* cvccvv (n) 'murdered people'. These templates are selected non-productively by the root and thus they are lexically merged together deriving a complex word with specific meaning. Semitic languages use template morphology to turn a root into a word as evidenced by Hebrew and Arabic.

morphophonologically as inflectional affixes that are manifestations of some features of a lexical heads (Li, 2005, pp. 33 and 34). For instance, the plural suffix (e.g. *-uun*) is the syntactic functional *Num* head since it determines the number specification for the noun (e.g. *muddarris*). I argue based on evidence that I show in section (4) that the SP (e.g. *muddarrisuun*) is formed syntactically through merger of the head suffix with the noun as illustrated in (20) (irrelevant details are omitted):

(20) a. DP

b. DP

D NumP

D NumP

Num NP

Num NP

plural N

muddarrisuun

-uun muddarris

muddarris merges with *-uun* and forms syntactically a complex word.[48] The derived syntactic word is non-atomic since merger can access the two morphemes: the inflectional morpheme and the noun. However, *Num* may not refer to the internal part of the word *mudarris*.[49]

To summarize the discussion, we can say that LSH in (17) controls how morphology operates in the grammar. Derivational and inflectional morphology apply at the lexicon and the syntax respectively and each is equipped with a set of conditions and mechanisms ensuring its well-formedness. The diagram in (21) illustrates how morphology works:

(21) lexicon → derivational morphology

word

syntax → inflectional → morphology

Phonological Form

Derivational morphology builds a word internally and hence the morphology is nonconcatenative. For example, *rijaal* involves mixing the consonant and the vowel morphemes. Then the word enters syntax as a basic atomic unit whose internal structure cannot be affected by the syntax. Then syntax attaches the inflections (of the SP) at the periphery of the word. For example in *muddarrisuun*, the inflectional morpheme segments are stacked next to each other at the end of the word. In other words, derivational morphology feeds inflectional morphology since the word which is created by derivational morphology is the basic input for inflectional morphology which in turn feeds PF. We turn our attention now to pieces of evidence that support LSH.

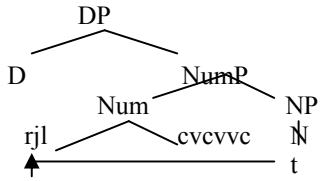
4. Evidence for LSH

In this section, I provide four different pieces of support for MSH based on: the syntactic representation, the semantic distinctions and lexical access, and morphological productivity of number of BP and SP.

The Syntactic and phonological Representation of BP and SP

I argue that BP is derived lexically through a morphological merger. Let us assume that the BP *rijaal* 'men' is decomposed in syntax as two heads and examine the implications:

(22)



The structure in (22) represents Num which is a syntactic functional head that is responsible for checking number as argued by Ritter (1992). The Num node is already filled with the plural pattern CVCVVC. The consonant root *rjl* moves to adjoin to the plural pattern in order to derive *rijaal*. However such movement violates c-command condition as defined below (Chomsky 1994: 8):

(23) A c-commands B if and only if A does not dominate B and every node that dominates A also dominates B.

Based on (23), *rjl* does not dominate its trace because they are in two independent nodes. Num dominates *rjl* but not its trace. Thus the trace is not c-

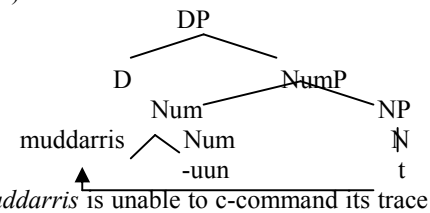
[48] Movement is not a necessary operation deriving the SP *mudrrisaan*. In fact, in recent developments of the minimalist program there is growing tendency to do without movement. For instance, Stroik (2009) argues in favor of a more local syntactic operations replacing the movement analysis. Extending Stroik's analysis, we may assume that the *Num* head merges locally with the *mudarris* pre-spell-out to check the strong number feature.

[49] *Num* can only access the category of the whole word which is a noun. Num cannot refer to the embedded root (e.g. *drs* of *mudarris*) since the root and the template form a local domain in Marantz' sense (2000) or an atomic domain in Di Sciullo's sense (1996).

commanded; hence the movement of *rjl* to Num is not possible. This is a welcome result since we do not want a syntactic principle (e.g. movement) to access only part of the word while ignoring the other part since the word *rijaal* is an atomic unit that functions syntactically as a morphologically complex word as implied by (17a). Suppose that there is yet another case scenario. The pattern as well as the consonant root start out under N in (22) and then move syntactically to Num to check number. This is not possible either since it generates a bad structure as in the case of dual and plural BP that I explain in (4.3). There is yet a third option which is to syntactically merge the consonantal root (e.g. *rjl*) with the plural pattern (e.g. *CVCVVC*). This implies that the syntax can access the internal stem root *rjl* and merges it with its plural pattern. However this will be too a direct violation of the atomicity condition since the internal structure of word is inaccessible by a syntax. This leaves us with only one logical option: to derive the BP lexically in the lower N through morphological merger between the consonant root and the plural pattern.

As for SP, Let us assume that it is derived syntactically through movement of the noun to adjoin to Num as (24) illustrates:

(24)



The noun *muddarris* is unable to c-command its trace since Num dominates the noun but not the trace. Therefore the noun cannot move to Num. This leaves us with the possibility that the SP is derived by means of merging the adjacent noun and the inflectional suffix in NumP in syntax without the need of movement and then fusing them phonologically after spell-out in one word.[50] As mentioned in footnote (48), there is a growing trend to abandon movement altogether as a syntactic operation for a more optimal theory where syntactic operations are local and involve *merge* and *remerge* dispensing with movement (Stroik , 2009). As a result, we may assume that a functional head *Num* merges with the noun in a local domain, *NumP*, to satisfy the feature of the functional head which is plurality. Put another way, the two morphemes of the SP are syntactically adjacent to each other. Based on the minimalist program, the two heads are placed in a functional projection *NumP* prior to spell-out. The functional projection of *NumP* is a syntactic means for the linearization requirement of the inflectional suffix to the noun as demanded by Kayne's *Linear Correspondence Axiom* (LCA). In accordance with the LCA, the Num asymmetrically c-commands the NP in syntax, they merge in phonology after spell-out and the suffix is linearly ordered at the edge or periphery of the word as in *mudrris**uun***[51].

On the other hand, the BP is lexically derived as one basic complex word which is syntactically indivisible into morphemes. As indicated above, *rijaal* has the plural pattern (e.g. *CVCVVC*) and the consonantal root (e.g. *rjl*) that are realized in syntax as one morphological unit. Therefore the LCA does not deal with internal parts of the word *rijall* and is invisible to them. Interestingly that is why the BP is formed by means of a lexical internal stem change whereby the morphemes (i.e. consonants, vowels, and prosodic template) are nonconcatenatively mixed unlike the case in the SP where the suffixes, influenced by the LCA, are concatenatively attached after the stem. As a consequence, it should be clear by now why we

[50] It is necessary to indicate that non-lexical merger can have a syntactic and phonological sense. To illustrate, the syntactic merger builds a phrase out of lexical items while the phonological merger is the one that links an in inflection (i.e. a bound morpheme) to a word.

[51] The SP inflection is the head and it is the rightmost member of the word. Based on the LCA, one would expect the head of the word to be leftmost member as it is the case in the syntactic heads in a phrase. Kayne (1994: 41) argues that the LCA can account for the rightmost member as the case of suffix of words in English by suggesting that the word is an adjunction structure and that the head, which is adjoined to, is preceded by the rest of the word. Likewise we can provide a similar account for the SP. Hence the SP suffix, e.g. *–uun*, is preceded by the noun *muslim* due to LCA.

cannot derive the SP in the lower NP in (24) and then raise up in syntax to Num to check the number feature because, beside the violation of the atomicity condition of the BP, the distinction between the BP and the SP will be eliminated since we would treat the SP as one complex word syntactically as the BP. In other words, we need to ensure that the BP and the SP enter syntax as one and two morphemes respectively given their syntactic and phonological distinctions.

The Semantic Distinctions and Lexical Access of BP and SP

In this section, we show that BP and SP differ in their processing and their mental representation in the lexicon and as a consequence they have semantic distinctions.

The lexical storage of words and how they are represented and retrieved is the focus of theoretical linguistics as well as psycholinguistics research. There are different proposals of lexical access in psycholinguistic research. One is called the full listing hypothesis in which a lexical item is accessed as a whole. Another is the decomposition hypothesis that maintains that words are decomposed into morphemes before they are accessed. There are hybrid models in which decomposition and whole word access are embraced.[52]

Mimouni et al (1998) conducted a research to investigate the word recognition process of the singular and the plural nouns of BP and SP of 24 Algerian non-brain damaged subjects and 2 agrammatic aphasic patients.[53] The test consisted of 8 blocks and each block consisted of 150 pairs of words. The subjects were asked to decide as rapidly and as accurately as possible if the word is a real word in Algerian Arabic or not by choosing the appropriate keys assigned by the program. The results revealed that the BP is processed faster since the BP is accessed as a whole word while the SP takes a longer time to process in comparison with BP because the SP is decomposed into a stem and a suffix.

The experiment interestingly indicates that the BP is lexically represented as one word while the SP is realized as a stem and a suffix. Furthermore the singular and the BP plural and their singular forms are stored in lexicon as two separate lexical entries. Mimouni et al (1998) concludes that BP is lexicalized while the SP is formed by word formation rules. These results are consistent with my analysis of the BP and the SP.Since the BP and the SP employ different processing mechanisms and they are derived using different morphological mechanisms, it is expected that they show semantic distinctions. That's, a BP is a morphologically complex word associated with lexical unproductive semantics. For instance, as we have shown earlier, the paucity plural refers to a group of individuals or things from three to ten while the multiplicity plural, another type of BP, refers to a group of individuals or things from three to more than ten. As we have indicated in section one, there is disagreement among Arab grammarians with regard to the exact number specification of the multiplicity plural. On the other hand, the SP involves a productive semantics. The suffix *-aa-* is used transparently for the dual while the plural suffix *-uu-* refers to more than three individuals or things. Arabic morphology utilizes derivations and inflections to mark number in the noun. In other words, derivations are used lexically to derive a plural word, i.e. BP. On the other hand, inflections may be used syntactically to make a singular noun plural as in the case of the SP.

Morphological productivity of number of BP and SP

The BP is derived lexically as a morphological complex word through an internal stem change. On the other hand, the SP is derived through syntactic suffix addition. Some nouns may however involve two processes of plurification: one process deriving a BP and another forming a SP. Consider the following examples:

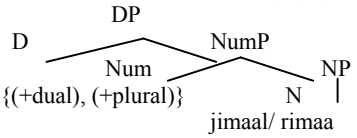
(25) sg BP dual BP plural BP

jamal 'a camel' jimaal 'camels' jimaalaan 'two groups of camels' jimaalaat 'groups of camels'

rum 'a spear' rimaa 'spears' rimaa aan 'two clumps of spears' rimaa aat 'groups of spears'

The BP is derived lexically in the lower N position while the SP is derived at Num as illustrated by (26):

(26)



If we derive that the BP in Num, then the secondary suffix (forming the SP) will have no place available which results in ungrammatical structure. The derivation of the words in (25) applies in the following order: The word is first derived as a BP in the lower N. Then the SP suffix in Num is attached and realized phonologically at the periphery of the word. There will be only one SP suffix pronounced at the end of the word; hence, it is going to be either plural or dual SP but not both.

[52] For more details, see Mimouni, et al (1998, vol 61, pp. 63-87). See also Vannest and Boland (1999, vol 68, pp. 324-332).

[53] See Mimouni et al (1998).

Now let us compare the dual and plural BP in (25) to the simple BP and the plural of plural in (27) (examples are taken from McCarthy and Prince, 1990, ex.14):

(27) sg BP plural of plural
d ‘rib’
d d

‘eagle’

In (27), there is one morphological plural process related to the whole word. To illustrate, the BP as well as the plural of the plural are not generated by means of adding a morphological marker like the SP. But they are derived through stem internal modification. So we cannot isolate the stem from the plural affix, hence reinforcing the claim that the plural formation is indeed part of the internal structure of the word. It might be obvious to observe that the BP has one process of plural formation, namely forming the BP. But what about the plural of the plural that seems to be associated with two plural processes? However this is not the case. For example □□□□□□□ does not involve two processes of plural formation: one for the BP and another for the plural of the plural. This would be plausible if the BP and the plural of the plural can be distinguished morphologically and syntactically. But they are part of the internal structure of the word; therefore, they are derived at the lower N in (26). It is interesting to observe that the distinction between them is not morphological or syntactic but semantic. That is, BP refers to more than three while the plural of the plural refers to more than ten (Hassan, vol. 4. pp.675). Had there any SP affix added we would expect it to appear at the end of the word as in *s awaa ibaat* in (28) which is indeed the case:

(28) sg BP plural of plural female plural of plural
s aa ib ‘companion’ s a b
s awaa ib s awaa ibaat

5. **Hebrew Diminutive structure**

In this section, I consider the Hebrew diminutive structure *-on* and compare it to another non-diminutive *-on* form. Interestingly in the case of diminutive *-on*, the word-internal morphological features become visible. But for the non-diminutive *-on* form the features of *-on* are invisible and opaque. I argue that LSH proposed in (17) can predict and explain the contrastive morphological behavior of both *-on* forms.

The diminutive can be expressed by means of attaching the suffix *-on* productively to the noun base.[54] Consider the following examples (the examples are taken from Bat-El 1997: 300):[55]

(29) Noun Diminutive
ye led ‘boy’ yaldon ‘little boy’
sus ‘horse, masc.’ suson ‘little horse, m’
mixtav ‘letter, masc.’ mixtavon ‘little letter, masc.’
safam ‘mustache, masc.’ sfamon ‘little mustache, masc.’

The suffix *-on* has a predictable semantics and transparent morphological application as illustrated in (29). Bat-El observes that any gender and number suffixes may be attached to the diminutive *-on* except the feminine plural as shown in (30) (the examples are taken from Bat-El 1997: 295):

(30) masc.sg. fem.sg masc.pl. fem.pl.

[54] The diminutive can also be derived in Hebrew by means of reduplicating the final syllable of the noun base. This type, unlike the diminutive *-on* form, seems to be lexically associated with certain nouns and it is associated with idiosyncratic meaning. Examples of the reduplicative diminutive include: *xazarzir* ‘piglet’ from *xazir* ‘pig’. Another example is *btsltseil* ‘small type of onion’ from *baatsal* ‘onion’. Reduplicative diminutive cannot apply to any word like for example *xamor* ‘donkey’ deriving ***xamarmor*** ‘little donkey’ as indicated by Dr. Ibraheem Nasraddiin Dibikee (personal communication). I would like to sincerely thank Dr. Dibikee, a professor of Hebrew at the College of Languages and Translation at King Saud University in Riyadh, for the time he gave me to discuss diminutive forms in Hebrew as well as checking the Hebrew words. Despite his busy schedule, he spared much of his time to work hard and refer to the Hebrew language sources to verify the data. I greatly appreciate his help.

[55] See Bat-El (1997, pp. 289-316).

Xayalon	xayalo net	xayalonim	*xayalonot
	'little soldier'		
Tabaxon	tabaxo net	tabaxonim	*tabaxonot
	'little cook'		
xatulon	xatulo net	xatulonim	*xatulonot
	'little cat'		

Let us compare nouns taking the diminutive *-on* in (30) with nouns that lack the diminutive (the examples are taken from Bat-El 1997: 292):

(31)

masc.sg.	fem.sg	masc.pl.	fem.pl.	
Xayal	xaye let	xayalim	xayalot	'soldier'
Tabax	tabaxit	tabaxim	tabaxiyot	'cook'
xatul	xatula	xatulim	xatulot	'cat'

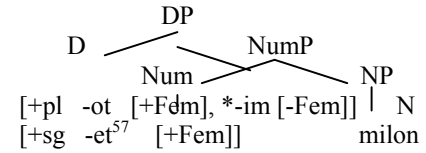
The nouns with the diminutive-*on* in (30) may be associated with the masculine plural suffix (*-im*) as well as the feminine singular (*-et*) but not with the feminine plural (*-ot*) as marked by the asterisk. In other words, the feminine plural cannot co-occur with the diminutive suffix. On the other hand, nouns lacking diminutive *-on* (in 31) have no exceptions. Bat-El (1997) attributes this gap to the visibility of the diminutive feature which is [–fem] that disagrees with the *-ot* feature [+fem]. The diminutive forms together with the base what Bat-El calls a *compositional* morphological domain in which both morphological units contribute features to the word.

There is yet another type. A non-diminutive *-on* in which *-on* is an indivisible unit of the word. Bat-El considers this type *non-compositional* since the suffix and the noun base form a morphologically complex word that cannot be further composed into smaller morphemes. For instance, *mila* 'word, fem.' may be associated with a non-diminutive *-on* deriving *milon* 'dictionary, masc.'. The plural feminine suffix can also be added forming *miloniyot*.[56] Bat-El observes (1997, pp. 306) that the non-diminutive *-on* is [–fem] and disagrees with the [+fem] of the suffix *-ot*. It is obvious that if agreement is required here as for the diminutive *–on* in (30), then *miloniyot* would have been blocked. But this is not case. Thus Bat-El believes that the gender feature of the non-diminutive *-on* is invisible and inaccessible and that is why there is disagreement in gender features.

[56] The examples are taken from Bat-El (1997, pp. 306).

The (in)visibility of the gender feature of *-on* is a direct consequence of the LSH. That's, a non-diminutive *-on* is derived lexically as an atomic word while a diminutive *-on* is derived syntactically through merger and agreement. To begin with, the non-diminutive *-on* gender feature is invisible as argued by Bat-El because it is part of an atomic word that is completely sealed off from the access of syntactic principles like merger or agreement. In syntax, the word *milon* is derived as a one unit and specified for the feature [+fem]:

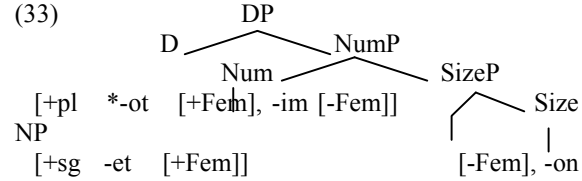
(32)



The noun *milon* 'dictionary, masc.' is derived at N and merges with *-ot* and agrees with it in [+pl] and they both match in [+fem] feature. *milon* can also merge with the plural suffix *-it* and match the [+fem] feature of *milon*. However *milon* cannot merge with *–im* since there is no agreement in [+fem]. The non-diminutive *-on* feature is atomic and hence cannot be accessed by agreement. However syntactic agreement can instead access the features of the whole word *milon*.

On the other hand, the diminutive *-on* is visible and has to agree with the gender of the plural suffix otherwise ungrammatical structure like **xayalonot* would be formed. The LSH provides an explanation. Let us consider the following diagram:

(33)



I consider the diminutive suffix as an inflection realized in Size head given its predictability and

[57] Hebrew has other feminine singular features like *-it* in *tabaxit* 'cook, fem.' and *-a* as in *susa* 'horse,fem'. I will not discuss them here since they are irrelevant to the main discussion. But check (Bat-El 1997, pp. 299) for details.

visibility to agreement in gender feature. Had it been derived together with the base as a lexical atomic word, then we have no way of accounting for the ungrammaticality of **xayalonot*. Let us provide an explanation. The word *xayal* merges syntactically with *–on* producing *xayalon* which makes the gender of the word after merger [-fem]. The word then merges with the plural masculine suffix *–im* since they share the feature [-fem]. However *xayalon* cannot merge with plural suffix *-ot* because they disagree in the feminine feature. *Xayalon* can also merge with the singular suffix *–et* changing the gender feature from feminine to masculine. It is worth observing that it is not only the diminutive but also the other inflections like the plural and singular suffixes that are visible for syntactic agreement. For example, it is ungrammatical as indicated by Bat-El (1997: 289) to produce a form *yaldo netim* 'little girl, plural feminine, masc.' since the suffixes *-et* and *-im* contrast in their gender features. We can only produce a feminine singular form *yaldo net* or a masculine plural *yaldo nim*.

6. Conclusion

Morphology cannot be determined by the principles of syntax independent of the lexicon or vice versa. An analysis respecting the principles of both proves to be empirically superior. I have proposed a morphological analysis (LSH) that determines the domain of influence for the lexicon and syntax in the formation of the BP and SP. Evidence for LSH is based on four different pieces of argument: lexical access, morphological productivity, semantic distinctions of number and the lexical and syntactic representation of BP and SP. LSH predicts that a word-internal structure can be visible if it is accessed by the syntax; otherwise it becomes lexically opaque as the diminutive and the non-diminutive *–on* structures in Hebrew prove.

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