Remarks and Replies

The Directionality of Emphasis Spread in Arabic

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Many modern Arabic dialects exhibit asymmetries in the direction of emphasis (for most dialects, pharyngealization) spread. In a dialect of Yemeni Arabic, emphasis has two articulatory correlates, pharyngealization and labialization: within the phonological word, pharyngealization spreads predominantly leftward, and labialization spreads rightward, targeting short high vowels. Since asymmetries in the directionality of spread of a secondary feature are phonetically motivated and depend on whether the feature is anchored to the onset or the release phase of the primary articulation, it is argued that the unmarked directionality of spread should be encoded in the phonology as a markedness statement on that feature.

Keywords: Arabic dialects, emphasis, Grounded Phonology, labialization, pharyngealization

This article considers phonological emphasis in Arabic. It is divided into two parts. I first discuss an article by Davis (1995) on asymmetries in emphasis spread (spread of [RTR]) in two dialects of Palestinian Arabic, and argue for the significance of directionality in emphasis spread. I then present further supporting arguments for a hypothesis regarding directionality of spread by considering data from Ṣan¨ānī, a dialect of Yemeni Arabic, in which emphasis has two articulatory correlates, pharyngealization and labialization, and by discussing the asymmetries in the directionality of spread, particularly of labialization, in this dialect.

1 Emphasis Spread and Grounded Phonology

In an article on emphasis spread in two modern Palestinian dialects of Arabic, Davis (1995) adopts Grounded Phonology (Archangeli and Pulleyblank 1994) to account for sets of opaque

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phonemes found in these dialects and for differences in the directionality of emphasis spread. The pattern of emphasis spread (in this case spread of pharyngealization) varies from dialect to dialect in Arabic: in Cairene emphasis usually affects the whole phonological word; in Abha (spoken in Saudi Arabia) emphasis rarely spreads beyond the adjacent vowel; in Qatari Arabic emphasis spreads bidirectionally over the whole word, and where the emphatic is the first segment of a word, emphasis may also spread leftward across the word boundary into the adjacent word (Bukshaisha 1985:217–219). In the two Palestinian dialects Davis considers, emphasis spread is bidirectional within the phonological word but exhibits a rightward/leftward asymmetry: leftward spread is generally unbounded, whereas rightward spread is blocked by a set of opaque segments for each dialect. Grounded Phonology views opacity as the result of imposing a grounded path condition on the target of a rule rather than (more traditionally) as the result of specifying opaque segments for the opposite value of the spreading feature. A grounded path condition is taken to be a feature cooccurrence restriction that can be motivated by phonetic criteria. Grounded path conditions are labeled as weak or strong depending on the strength of phonetic motivation and on how phonologically common they are across languages. Archangeli and Pulleyblank demonstrate that there are grounded path conditions on the features [ATR] and [low] and on the features [RTR] and [high], as in (1) (Davis 1995:468).

(1) a. *ATR/LO Condition*
If [+ATR] then [−low].
If [+ATR] then not [+low].
b. *RTR/HI Condition*
If [−ATR] then [−high].
If [−ATR] then not [+high].

In the southern dialect of Palestinian Arabic that Davis discusses, right-to-left emphasis spread (pharyngealization) is unbounded within the phonological word; however, left-to-right emphasis spread is blocked by the [+high, −back] phonemes /i, y, š, j/. Consider the examples in (2) and (3) (see Davis's (11) and (12)).[1]

(2) *Words displaying leftward spread of emphasis (a southern dialect of Palestinian Arabic)*
a. BALLAAṢ ‘thief’
b. HAḌḌ ‘luck’
c. ¨AṬšaan ‘thirsty’
d. ¯ABSAṬ ‘happier’
e. MAJAṢṢAṢ-iš ‘it did not solidify’
f. NAṨAAṬ ‘energy’

[1] Following Davis, targets of pharyngealization are transcribed in uppercase, a dot under a letter indicates the underlying emphatic, and lowercase letters indicate surface nonpharyngealized sounds. /j/ represents a voiced palatoalveolar affricate, and /y/ represents a palatal glide. In contrast to Davis, the voiceless pharyngeal fricative is transcribed with a subscript dot, the interdentals are transcribed with a subscript line, and the emphatic interdental fricative is transcribed with a subscript line plus a subscript dot.

(3) *Words displaying rightward spread of emphasis (a southern dialect of Palestinian Arabic)*

a.	ṢABAAḤ	'morning'
b.	¯AṬFAAL	'children'
c.	ṬUUB-AK	'your m.s. blocks'
d.	ṢOOT-AK	'your m.s. voice'
e.	ṢEEF-AK	'your m.s. sword'
f.	Ṭiin-ak	'your m.s. clay'
g.	ṢAyyaad	'fisher; hunter'
h.	¨AṬšaan	'thirsty'
i.	D̲Ajjaat	[type of noise]

As (3) illustrates, rightward spread of emphasis is blocked only by members of the set /i, y, š, j/ (but interestingly, not by *ee* (3e), which derives historically from the diphthong /ay/). Even epenthetic [i] serves to block rightward spread in this dialect, as illustrated in (4b).[2]

(4) a. BAṬN-AK 'your m.s. stomach'
b. BAṬ*i*n-ha 'her stomach'

In the northern dialect of Palestinian Arabic that Davis discusses, emphasis spreads leftward from the underlying emphatic consonant to the beginning of the word (though it may optionally fail to spread into inflectional prefixes (Davis 1996:484)); however, rightward spread is frequently restricted to a following low vowel and is blocked by an intervening high phoneme /š, y, w, i, u/ (Herzallah 1990). Since data from the northern dialect of Palestinian Arabic do not add to, or detract from, my argument, I shall not consider this dialect further.

2 Feature Relations in Grounded Phonology

In Grounded Phonology, feature relations are said to be either sympathetic or antagonistic. Thus, it can be said that [+high, −back] vowels and consonants (i.e., /i, y, j, š/) block rightward spread of [RTR] in the southern dialect of Palestinian Arabic under investigation precisely because the tongue body retraction required for RTR (spread of pharyngealization) is antagonistic with the high tongue body configuration needed for [+high] and the front tongue body configuration required for [−back]. In other words, the cooccurrence of [RTR] and [+high, −back] is disallowed because the two (sets of) features are physiologically antagonistic (Davis 1995:475). For the southern Palestinian Arabic dialect, the RTR/HI Condition given in (1b) is modified as in (5) to include a condition on the cooccurrence of [RTR] and front segments, the RTR/FR Condition (Davis 1995:475).

[2] By contrast, Herzallah (1990:109–110fn., 190f., cited in McCarthy 1997) claims that epenthetic [i] in northern Palestinian Arabic is phonologically featureless.

(5) a. *RTR/HI Condition*
If [RTR] then not [+high].
b. *RTR/FR Condition*
If [RTR] then not [−back].

That [RTR] spread in southern Palestinian Arabic is blocked by the set of [+high, −back] consonants and vowels is indisputably a phonetically grounded condition since it is physiologically motivated. However, as Davis points out, whereas left-to-right [RTR] spread is blocked by [+high, −back] and is thus subject to the antagonistic RTR/FR and RTR/HI Conditions, right-to-left [RTR] spread is *unbounded* (see (2)). Davis proposes that this discrepancy is accounted for by the fact that grounded path conditions may be process specific and do not necessarily hold for the entire language; thus, Grounded Phonology invokes the target conditions (5a–b) on the rule of rightward spread but not on the rule of leftward spread. The rule of rightward emphasis spread for southern Palestinian Arabic is expressed as in (6) using the parametric rule formalism developed by Archangeli and Pulleyblank (1994) (Davis 1995:476).

(6) *Rightward Emphasis [RTR] Spread (in a southern Palestinian dialect)*
Argument
[RTR]
Parameters
1. Function: INSERT
2. Type: PATH
3. Direction: LEFT TO RIGHT
4. Iteration: ITERATIVE
Structure requirements
1. Argument structure: NONE
2. Target structure: FREE
Other requirements
1. Argument condition: SECONDARY PLACE
2. Target conditions: RTR/HI and RTR/FR

Compare this with leftward emphasis spread, in which there are *no* target conditions (Davis 1995: 477–478).

(7) *Leftward Emphasis [RTR] Spread (in a southern Palestinian dialect)*
Argument
[RTR]
Parameters
1. Function: INSERT
2. Type: PATH
3. Direction: RIGHT TO LEFT
4. Iteration: ITERATIVE

Structure requirements
1. Argument structure: NONE
2. Target structure: FREE

Other requirements
1. Argument condition: SECONDARY PLACE
2. Target conditions: NONE

In this article I argue that although the phonetic reasons presented by Davis for the blocking of rightward emphasis spread in Palestinian Arabic are valid, an appeal to the process-specific nature of grounded path conditions alone fails to explain the *lack* of target conditions on leftward emphasis spread. As they stand, the spread rules expressed in (6) and (7) are ad hoc: there is nothing in their formulation to indicate that unbounded rightward spread is any less phonetically motivated than unbounded leftward spread. The asymmetrical behavior of emphasis spread in these and other dialects of Arabic can, however, be explained on physiological grounds if one takes into account the articulatory phonetics of the secondary articulation involved: namely, that pharyngealization (like velarization) is anchored on the onset phase of the primary articulation and for that reason tends to spread in an anticipatory manner, affecting the formants of preceding segment(s) more than the formants of following segment(s) (Ladefoged and Maddieson 1996: 360–361). Thus, the process-specific nature of the grounded path conditions in this case is phonetically motivated. Davis anticipates this argument but dismisses the significance of directionality of spread in a footnote:

> Although there may be some articulatory explanation for this [i.e., directionality of spread] involving a difference between anticipatory pharyngealization and perseveratory pharyngealization, it may also be an accident of the dialects surveyed, given that very few dialects have been described carefully with the aim of determining phonemes that are opaque to emphasis spread. In this regard, on the basis of very preliminary work that I have done, the phoneme /y/ seems capable of blocking leftward spread in a Saudi Arabic dialect. Although emphasis in this dialect normally spreads leftward from the underlying emphatic to the beginning of the word, as shown by a form like [ˉABSAṬ] 'simplest', emphasis spread is blocked if a /y/ precedes the underlying emphatic, as shown by a form like [ˉabyAḌ] 'whitest'. (1995:494)[3]

The Saudi Arabic example [ˉabyAḌ], however, does not in itself negate the importance of the directionality of spread; it would do this if and only if forms such as [ṢAYYAAD] 'fisher; hunter' and [¨AṬŠAAN] 'thirsty', where [+high, −back] phonemes fail to block rightward spread, were also attested in the same dialect. Emphasis spread, like many other phonological processes, operates within certain parameters that are at least in part determined areally. Thus, in Palestinian Arabic leftward emphasis spread appears to be unbounded, whereas rightward spread is bounded (though the precise set of opaque phonemes and the degree of boundedness differ between dia-

[3] [ˉABSAṬ] is translated as 'happier' by Davis in (2) (his (11)).

The gloss of [ˉabyAḌ] should read 'white' and not 'whitest' as here; in specific contexts it can also mean 'whiter'. For the dialect discussed, [ˉabyAḌ] should also read [ˉabyAḌ̲] with a final voiced pharyngealized fricative.

lects). In Abha Arabic, spoken in Saudi Arabia, emphasis rarely spreads beyond the adjacent vowel (Younes 1991, cited in Davis 1995:466; see section 1 above), and it is likely that spread in other dialects spoken in the same area is similarly restricted. Thus, more data will probably show that emphasis spread in this Saudi dialect is in general more bounded than it is, say, in Qatari or Cairene Arabic (cf. section 1), or in the Palestinian dialects mentioned above. My hypothesis regarding emphasis (pharyngealization) spread incorporating directionality predicts that of the following four logical possibilities, only the first three will occur:

(8) *Spread of pharyngealization*
1. Unbounded leftward spread; unbounded rightward spread
2. Unbounded leftward spread; bounded rightward spread
3. Bounded leftward spread; bounded rightward spread
4. *Bounded leftward spread; unbounded rightward spread

In sections 3–5 I present further supporting arguments for a hypothesis regarding spread that incorporates directionality by considering data from Ṣan¨ānī, a modern dialect of northern Yemeni Arabic, in which emphasis has two articulatory correlates. In this dialect the articulatory correlates of emphasis are pharyngealization with concomitant labialization, and both of these phenomena spread from an emphatic consonant to other phonemes within the phonological word. As in the Palestinian dialects discussed above, Ṣan¨ānī Arabic exhibits asymmetries of emphasis spread, but with a difference: whereas pharyngealization spreads predominantly from right to left in Ṣan¨ānī, as in the Palestinian dialects, labialization spreads predominantly from left to right. I suggest that although language-specific factors may dictate the degree to which spread of a given feature in a particular language operates, the actual unmarked directionality of spread of that feature is determined by universal factors: the asymmetries of emphasis spread in Ṣan¨ānī Arabic, as in the Palestinian dialects, can be explained quite simply by the articulatory phonetics of the respective secondary articulation. In section 6 I propose that in a Grounded Phonology approach the directionality of spread of a feature should be incorporated into the phonology formally as a markedness statement that represents crosslinguistic tendencies based on phonetic motivation.

3 Labialization in Ṣan¨ānī Arabic

Jakobson notes that there is ''a tendency . . . to emit pharyngealized phonemes with a lip protrusion and slight rounding. . . . [O]n the other hand, the rounded phonemes occur with a slight narrowing of the pharynx to reinforce the acoustic effect of labialization. . . . [W]hatever orifice is contracted, there appears to be concomitant velarization: it pertains not only to the pharyngealised, but also to the labialized phonemes'' (1978:272–273). Although it is known that pharyngealized consonants are often articulated with a degree of lip protrusion, the effects of labialization on adjacent segments are less clear-cut and less well recorded than the effects of pharyngealization. Harrell notes for Egyptian Arabic that ''the lip protrusion [of emphatics] does not result in 'rounded' allophones of /i:, i, e:, a, a:/'' (1957:69–70), perhaps because of the ''tertiary'' nature of emphatic

labialization in this dialect; however, in a number of Arabic dialects labialization of short high front vowels does take place in the environment of emphatic consonants. In many dialects of Yemeni Arabic the short vowel of the imperfect verbal stem is realized either as *a* or as *u* when one of the root consonants is emphatic, but never as *i* (e.g., *yi**d̲ru**b* 'he hits', *yig**u**ṣṣ* 'he cuts', *yuṭ**u**ffi* or *yiṭ**u**ffi* 'he puts out'; see Goitein 1970:xvi and Qafisheh 1992:66, examples in Rossi 1939 for Ṣan¨ānī,[4] and Bettini 1985:121 for the dialect of Baraddūn). In Ṣan¨ānī, spoken in the capital of the Republic of Yemen, verbs of the pattern *fu¨ul* in the perfect aspect usually have an emphatic or a velar consonant in the root (e.g., *¨uṭuš* 'to become thirsty', *wuṣul* 'to arrive', *d̲uḥuk* 'to laugh', *muṭur* 'to rain', *¨uṭus* 'to sneeze', *kubur* 'to become big', *kuṯ̲ur* 'to become many'; Qafisheh 1992:44, Goitein 1960:366, 1970:xvi). Goitein also notes for dialects spoken in Higher Yemen that ''the emphatic . . . consonants . . . not only change the adjoining vowels, but color all the vowels in the same sound unit'' (1960:360–361). In some other modern dialects of Arabic short high vowels are invariably realized as *u* in the immediate environment of emphatic consonants: for Iraqi Arabic Erwin says that ''in a great many words . . . non-final *i* and *u* are in complementary distribution'' and notes that ''typically, *u* environments involve emphatics, labials, velars, and *r* in various combinations'' (1963:38). Examples of common *u* environments in Iraqi Arabic include those in (9).

(9) buṣaṭ 'he beat'
d̲ābuṭ 'officer'
ṣufar 'he whistled' (from Erwin 1963:38)
nād̲um [male personal name]

In the northern dialect of Palestinian Arabic discussed by Davis and mentioned briefly above (Herzallah 1990:181, cited in McCarthy 1994:220), the imperfect theme vowel *u* is said to be derived from *i* when adjacent to a coronal emphatic or a uvular consonant.[5]

In Ṣan¨ānī Arabic labialization of short high vowels extends beyond the domain of immediate adjacency and applies to all vowels within the phonological word to the right of, but to a far lesser extent to the left of, the emphatic. Compare the two columns of data in (10).

[4] Although not explicitly mentioning the relationship between *u* and emphatic consonants, Rossi gives examples of *u* in words containing emphatics where *i* is found in words lacking emphatics.

(i) *u*		*i*	
ṭ**u**rwag	'roads'	b**i**rwak	'ponds'
yiṭall**u**b	'he begs'	yilabb**i**s	'he dresses (someone)'
muṭall**u**b	'beggar m.'	mujaḥḥi**ṯ̲**	'lavatory cleaner m.'

[5] For Lebanese, Haddad (1983; cited in Kenstowicz 1994:42) shows that when the root [rxṣ] 'become cheap' maps onto the CiCiC template, a nonfinal *i* is realized as [u]: *ruxiṣ* 'became cheap' versus *rixis* 'became tender' (from the root [rxs]).

(10)	ɣāliyih	'expensive f.s.'	ṭayy**u**b**u**h	'good f.s.'
	madrasih	'school f.'	maṭrag**u**h	'hammer f.'
	kabīrih	'big; old f.s.'	ṭawīl**u**h	'tall f.s.'
	bayn-abnīhin	'I build them f.'	bayn-agd̲īh**u**n	'I am spending them f.'
	¨āriflih	'knowing m.s. it'	ḥāfid̲l**u**h	'remembering m.s.'
	yidarrisayn	'they f. teach'	yiḍamb**u**layn	'they f. drum'
	yimallīhin	'he fills them f.'	y**u**ṣaffīh**u**n	'he cleans them f.'

Although in most cases a high vowel that is realized as *u follows* the emphatic, in a few cases a *preceding* high vowel is realized as *u*, as in the final example in the right-hand column in (10). This is particularly the case with the imperfect prefix of final weak verbs (Watson 1996:267), where the prefix vowel is usually (though still optionally) realized as *u*. Compare the two columns of data in (11).[6]

(11)	yibnī	'he builds'	y**u**d̲wī	'he goes home'
	yimlī	'he fills'	y**u**ṣfī	'he cleans'
	yidrā	'he knows'	y**u**nṭā	'he walks'

Labialization of the prefix vowel occurs predominantly with form I final weak verbs but is also less commonly attested in form II and quadriliteral final weak verbs (the stems of which share the morphological pattern CVCCVV), as in (12).

(12)	yimallī	'he fills'	y**u**ṣaffī	'he cleans'
	yisawwī	'he does/makes'	y**u**ṣalfī	'he cleans'

In certain words the voiced guttural sounds ¨ and ɣ (but apparently not their voiceless counterparts *ḥ* or n) and *r* may also induce labialization of high vowels to the right or, in the case of form I third weak verbs, to the immediate left of the emphatic; see the right-hand columns of (13a–b).

[6] Barry Heselwood (personal communication) has suggested that labialization of the imperfect prefix vowel in these cases may be specifically due to the preceding *y*. Although *y* shows an antagonism to emphasis and to labialization, it could be that this antagonism has to be countered early on. It is probable that the *y* is affected by having a more retracted postpalatal tongue position: leftward leakage of labialization would then coincide with leftward spread of tongue retraction and result in a rounded dorsal vowel. This remains a tentative suggestion and will require further work using EMA (electromyography) or EPG (electropalatography) analysis. It does not, however, explain why the imperfect prefix vowel is labialized in third weak form I and II verbs but not in sound verbs such as *yiṭallub* 'he begs' given in (i) of footnote 5; nor does it explain why the imperfect prefix vowel is also optionally labialized where the prefix consonant is *t* or *n*, as in *tuṣalfī* alongside *tiṣalfī* 'she cleans' and *nuṣalfī* alongside *niṣalfī* 'we clean'.

Labialization of the imperfect prefix vowel in third weak verbs is still optional for all persons (e.g., *tuṣaffī* or *tiṣaffī* 'she cleans', *yud̲wī* or *yid̲wī* 'he goes home', *¨a-nid̲wī* or *¨a-nud̲wī* 'we will go home'); however, labialization to the left of the emphatic is attested only in the imperfect prefix of third weak verbs, and it is therefore probable that labialization in this case either has already been morphologized or is in the process of being morphologized.

(13) a.	ṯāliṯ	'third'	rābu$^{\text{ʿ}}$[7]	'fourth'
	as-sābiʿ$^{\text{ʿ}}$ašar	'the seventeenth'	ar-rābuʿ$^{\text{ʿ}}$ašar	'the fourteenth'
	gahwih	'coffee'	ɣudwuh	'tomorrow'
b.	ʿirs/ʿiris	'wedding m.'	ʿurs/ʿurus	(variant of *ʿirs/ʿiris*)
	yiʿjā	'he suckles'	yuʿjā	(variant of *yiʿjā*)

In most cases, however, the dominant *guttural* feature of the pharyngeals ʿ and *ḥ* overrides the labial feature when the pharyngeal occurs immediately to the left of the nominal feminine ending *-ih* or after the imperfect prefix *yi-*; see the right-hand column of (14).

(14)	maktabih	'his office m.'	maṣnaʿah	'his factory m.'
	maktūbih	'written f.s.'	maṣnūʿah	'made f.s.'
	ṭāguh	'window f.'	sāʿah	'hour f.'

4 A Labial Prosody

Long-distance labialization of high vowels, as in *ṭayyub* 'good', *ṭāguh* 'window f.', *bayn-agḏīhun* 'I am spending them f.', and so on, where the high vowel is not immediately adjacent to the emphatic consonant, appears problematic—as the examples are transcribed here, the suggestion is that labialization is ''switched off'' after the emphatic, then ''switched on'' for the high vowel. Articulatorily, lip rounding is apparent from the emphatic to the end of the phonological word; phonologically, however, [Labial] spread targets only short (monomoraic) [+high] vowels within the phonological word and can therefore be said to be contingent on the presence of the feature [+high] on the target. This can be expressed as the sympathetic LAB/HI Condition in (15).

(15) *LAB/HI Condition*
If [Labial] then [+high].
If [Labial] then not [−high].

Postlexically, labialization often affects guttural short and long vowels, particularly but not exclusively following the emphatic *ṣ*. The words given in (16) occur with a labial prosody spreading from left to right from, and including, the emphatic consonant.

(16)	ṣallaḥ	'he fixed'
	aṣ-ṣabāḥ	'the morning m.'
	aṣḥābak	'your m.s. friends'
	ṭāguh	'window f.'

Long *ī* and its nonsyllabic counterpart *y* do not generally have rounded allophones *ū* and *w* in the environment of emphatic consonants; however, the form II verbal noun pattern of some roots

[7] Labialization after /r/ is rare in Ṣanʿānī Arabic. In the case of *rābu*ʿ and *rābu*ʿ*ašar* labialization is probably historical and due to the effects of an erstwhile emphatic /r/, as found in other dialects (cf. Erwin 1963:38, where *r* is included among the *u* environments for Iraqi Arabic; and see above).

with an emphatic ṣ has two variants, one with the long vowel ī expected from the morphological pattern of the verbal noun (*taf¨īl*) and one with the long vowel ū.

(17) taṣlūḥ/taṣlīḥ ‘restoration; recovery m.’ (from *ṣallaḥ*)
taṣdūr/taṣdīr ‘covering note; sending m.’ (Piamenta 1990–1991:279)

In utterance-final position, phonological-word-final ā is subject to raising (*imāla* in Arabic) and is realized as [ē] when there is no emphatic consonant in the word, but as [ō] in a word with a root emphatic; see the left-hand column of (18).

(18) ḏawaynō ‘we went home’ katabnē ‘we wrote’
ṣaffaynō ‘we cleaned’ darasnē ‘we learned’

5 Spread of Pharyngealization

In contrast to labialization, pharyngealization in Ṣan¨ānī Arabic spreads leftward from the emphatic to the beginning of the phonological word, as in the examples in (19). (Surface pharyngealized sounds are indicated in uppercase, as above.)

(19) *Right-to-left spread of pharyngealization*
MISTAḌīluh ‘long f.s.’
¨ARḎuh ‘its m. length’
SALIIṬ ‘oil m.’

Preliminary analysis indicates that rightward spread of pharyngealization is more bounded than leftward spread; however, the effect of the opaque phonemes—whether they block the spread of pharyngealization or simply reduce it catastrophically—awaits further analysis.

6 A Phonetic Account of Emphasis Spread

The asymmetrical directionality of emphasis spread in Ṣan¨ānī Arabic can be ascribed to the phonetic characteristics of the respective secondary articulations. Where secondary articulations are involved, there is asymmetry in timing between the primary and secondary articulation (Ladefoged and Maddieson 1996:357). In pharyngealization, the pharynx narrows prior to the hold phase of the primary articulation; thus, pharyngealization is anchored more on the onset of the primary articulation, which results in the anticipatory nature of spread of pharyngealization as with velarization (cf. Laver 1994:327, Ladefoged and Maddieson 1996:360–361). In labialization, protrusion of the lips tends to occur on or after the hold phase of the primary articulation; thus, labialization ‘‘is typically concentrated on the release phase of the primary articulation that it accompanies’’ (Ladefoged and Maddieson 1996:357). As a result, the second formant of a vowel *following* a labialized consonant is lower than the second formant of a vowel *preceding* a labialized consonant (Ladefoged and Maddieson 1996:358).

In the spread of both pharyngealization and labialization there is an unmarked directionality of spread that I argue should be encoded into the phonology as (or as part of) a markedness

statement on the respective feature (cf. Archangeli and Pulleyblank 1994:184). The proposed markedness statements on [RTR] and [Labial] read as follows:

(20) a. *[RTR] markedness statement*
If [RTR] is used actively in spread processes, [RTR] spread tends to operate from right to left.
b. *[Labial] markedness statement*
If [Labial] is used actively in spread processes, [Labial] spread tends to operate from left to right.

A statement about the directionality markedness of a feature essentially says that one direction for spread of a given feature is more common crosslinguistically and more phonetically motivated than the reverse direction. The way in which markedness of the directionality of spread manifests itself will depend partly on the feature in question and partly on language-specific factors. In the Palestinian dialect discussed above, the strength of the unmarked direction of [RTR] spread (right to left) overrides the grounded path conditions (5a–b), with the result that leftward [RTR] spread is unbounded (and ungrounded); by contrast, the marked direction of [RTR] spread (left to right) is grounded and the antagonistic conditions (5a–b) serve to block rightward spread. In Ṣan¨ānī Arabic the sympathetic LAB/HI Condition (15) is invoked for the unmarked direction of [Labial] spread such that within the phonological word all and only monomoraic [+high] vowels to the right of the emphatic are targeted by [Labial]. [Labial] does not spread in the marked direction,[8] and therefore the sympathetic LAB/HI Condition is not invoked in leftward spread for this dialect.

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[8] Except where it targets the imperfect prefix vowel of a third weak verb; compare (11) and (12). Also see footnote 6.

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